

APRIL 16, 1942

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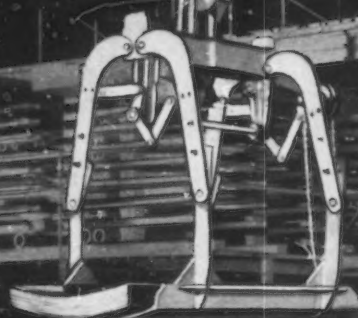
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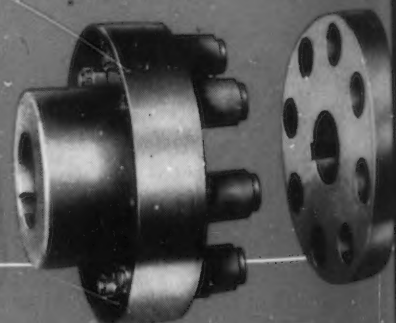
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VOL. 149, NO. 16



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Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, \$8; Foreign, \$15 a year. Single copy, 35 cents.
Cable Address "Ironage N. Y."

Owned and Published by
CHILTON COMPANY
(Incorporated)

Executive Offices, Editorial and Advertising Offices
Chestnut and 56th Sts. 100 East 42nd St.
Philadelphia, Pa. New York, N. Y.
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THE IRON AGE

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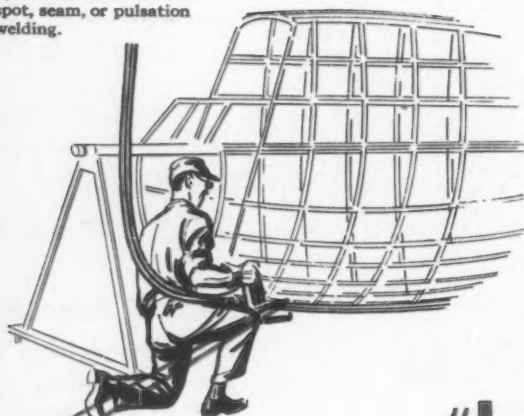
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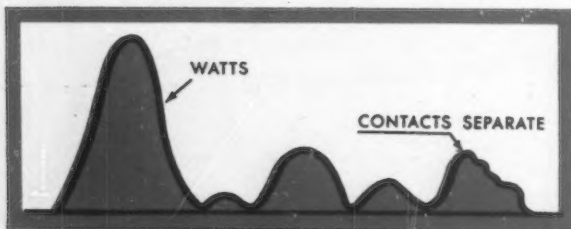
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APRIL 16, 1942

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ESTABLISHED 1855



Can You Save 30 Seconds a Day?

FIGHTING a war requires the abundant use of almost every imaginable material. Iron and steel, of course, are the most obvious ones, but the requirements run the entire alphabetical gamut from aluminum to zinc and with considerable additions to these and the intervening letters.

Nearly all of these materials come from the earth or under the earth, although there are some which come from the air, as for example one of the elements of nylon which is used for making parachutes.

There is one precious element, however, that is perhaps the most vital of all in conducting a successful war and it comes neither from the earth nor the air about it. It comes directly from the sun. It is *Time*.

A combatant nation can have an overwhelming superiority of raw materials, but unless it makes the most effective use of time this superabundance will count as naught. Fortunately, however, while time is fixed as to units of measurement, it is elastic as to contents. Thus, at times a single minute may contain as much of accomplishment as a whole hour or even a day. It depends upon what you put into it.

Our use of time is going to determine whether we win or lose this war. And in thinking of time, we must reduce it to its lowest terms and think of seconds. For seconds count.

Suppose, for example, that each of the 24 million workers in our industrial occupations could save but 30 seconds a day; thus adding 30 more seconds of accomplishment to each day's work. That would amount to setting the clock ahead by 198,000 hours, which would be equivalent to the output of 24,000 additional workers.

Donald Nelson, as I have said before, has told us that an ounce of production today will be worth a pound a year from now in winning this war. That's a ratio of 16 to one. And that means that if we could save 30 seconds per man per day now, it would be equivalent to putting 394,000 people on war work a year from now.

Three hundred and eighty-four thousand workers can produce a lot of output. Not many more than this made 5,000,000 automobiles a year, when the making of motor cars for private use was still in fashion.

And that number of men and women making munitions could certainly do a lot for Uncle Sam and his soldier boys.

Can you save 30 seconds a day? If you can, and will, you are shortening the war by 3 hours for every such saved half minute. Think that over!

John Van Dusen



The L. E. Block, flagship of the Inland fleet, coming into a northern lake port.

Inland's "Warships of Industry" Open Ore Shipping Season Early

Inland's ore freighters, the "warships of industry," have opened their season earlier than ever this year, for they are beginning a tremendous job.

In this year of 1942, the Inland fleet must transport the largest tonnages in history of ore and coal and limestone from Inland's own mines and quarries to the Inland docks

and mills—Inland must constantly strive to increase its already record-breaking levels of production.

The Inland fleet, prepared through the winter months, sailed this year a full week earlier than in any previous season—in order to assure an ample supply of raw materials for the steel that will provide guns, ammunition and ships needed for Victory.

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High Speed Steel Tips

Cemented to Low Alloy Shanks

By GEORGE SHULER

Foreman, Tool Development,
Timken Roller Bearing Co., Canton, Ohio

FOR many years attempts have been made to weld high speed steel to medium carbon steel shanks in making various cutting tools. However, with the exception of the electric resistance butt welding operation as used on drills, the process was never too successful, particularly for the reason that mortality of tools was extremely high due to cracks from welding and weak bonds. Even in butt welding, considerably more high speed steel is used than is used when tips only are inserted. Furthermore, many shops are not equipped with butt welding facilities. The waste of high speed steel in making solid tools has always been great. Many tons of high speed steel have been scrapped due to breakage at the tool post and many more tons discarded due to the tool being too short for tool holders after a limited number of regrinds.

These observations induced W. R. Chapin, a veteran metallurgist of Indianapolis, to see if a cementing process could not be developed which would make it possible to cement high speed steel tips on

medium carbon steel shanks. This research extended through nearly a quarter of a century and resulted in many failures. Finally, Mr. Chapin perfected a metallic, powder-fine cement which gave satisfactory results under the most severe tensile tests. These tests showed that specimens broke outside the cemented joint, indicating that the joint was at least as strong as the tool itself. Tool tips continued to render satisfactory service when as little as 1/16 in. remained. In many instances, the medium carbon shank seemed to act as a shock absorber, which gave a longer tool life than could be obtained from a tool made entirely of high speed steel.

The new product was given the name "Cinch" steel cement and was utilized on planer knives, limestone planer tools, steel shear blades, stone and woodworking

tools, and innumerable machine tool blades.

This cement is made by W. R. Chapin Co., 5703 Central Avenue, Indianapolis, consulting metallurgist.

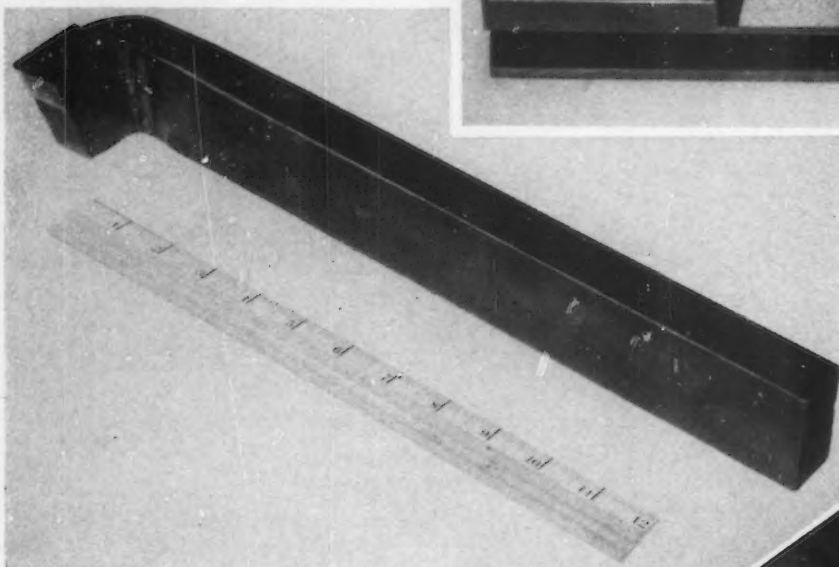
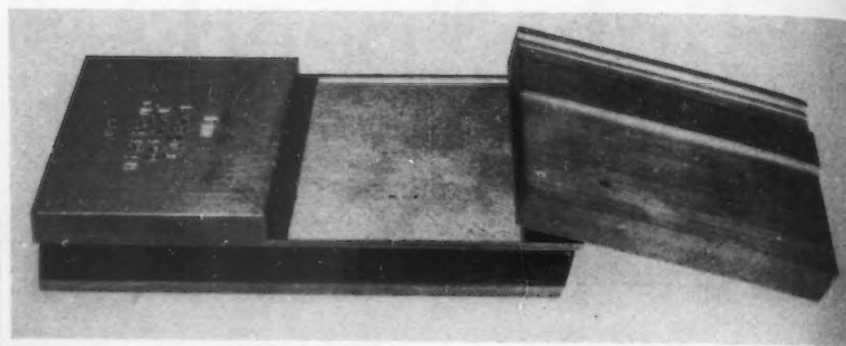
Now, with the coming of the war, Cinch steel cement is playing an increasingly important role in the conservation of high speed steel supplies. The toolmakers at the Timken Roller Bearing Co. plant at Canton, Ohio, report that this cement has effected the saving of at least 75 per cent of the former high speed tool steel consumption.

In fact, many pieces which were formerly regarded as scrap are now being effectively used in tool making. To illustrate: This cement used on 14 different types of tools with a total weight of 77 lb. 8 oz., made possible a saving of 74 lb. 10 oz. of high speed steel, at a cost saving of approximately \$60, with

... This is the second article showing how vital tool steel is being conserved by using it in tip form like the cemented carbides. The first article appeared in the March 26 issue, p. 53.

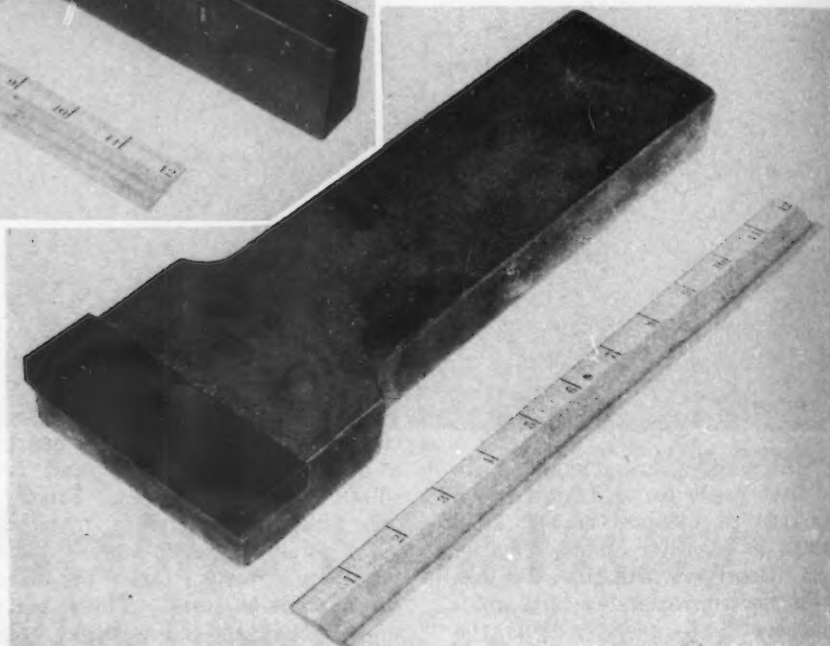
RIGHT

FIG. 1—This dovetail forming tool weighs $6\frac{1}{2}$ lb. and was formerly made entirely of high speed steel. Now Timken cements a 1 lb. 10 oz. tip on this tool, saving 4 lb. 14 oz. of high speed steel.



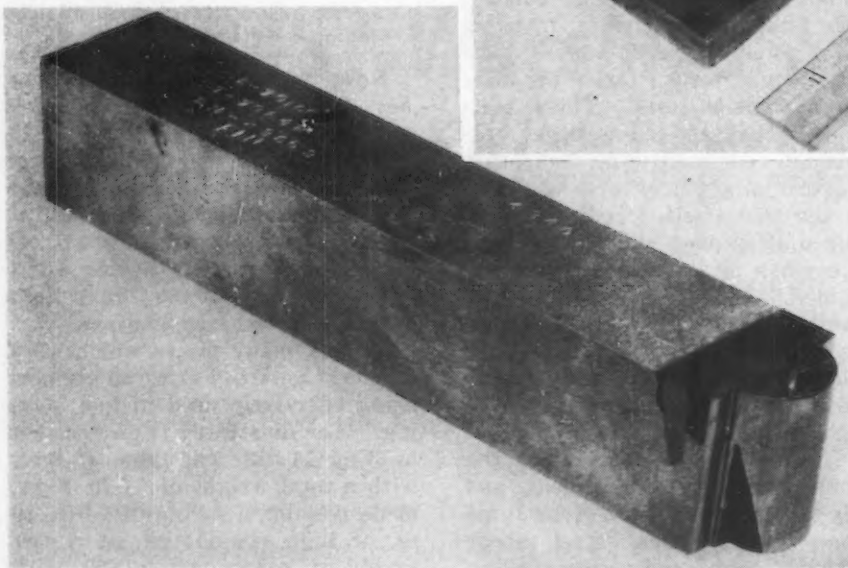
ABOVE

FIG. 2—Tipping this boring tool with high speed steel saved 8 lb. 10 oz. of precious, high tungsten steel. Tip weight, 12 oz.



BELOW

FIG. 3—The high speed steel tip cemented onto the end of this mill roll turning tool weighs 1 lb. and effects a saving of 13 lb. of high speed steel.

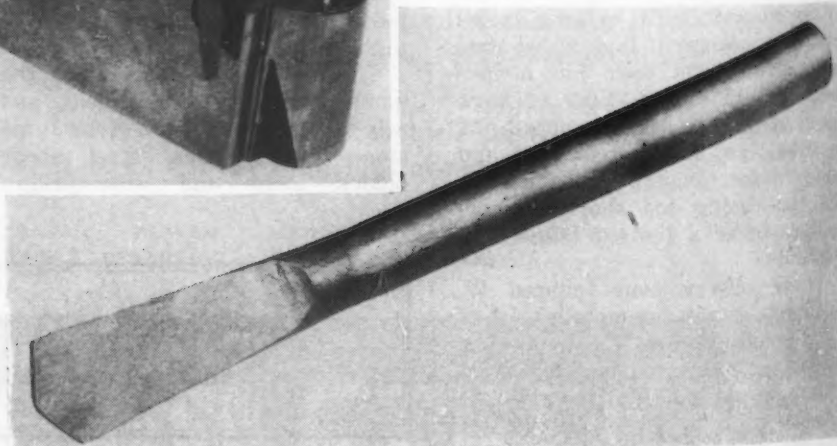


ABOVE

FIG. 4—The complete weight of this i.d. radius tool is 3 lb. The high speed steel tip weighs only 2 oz., but does just as effective work as if made completely of high speed steel.

BELOW

FIG. 5—Drill used in the laboratory for preparing steel samples. Weight of tool is 10 oz. The cutting part of the tool weighs $2\frac{1}{2}$ oz. and is butt cemented.



high speed selling for about 75c. per lb. and carbon steel at 3c. This is a 96.29 per cent saving in the amount of high speed steel used. For instance, the dovetail forming tool shown in Fig. 1 weighs 6½ lb. Formerly this was made entirely of high speed tool steel. Now Timken cements a 1 lb. 10 oz. piece on this flat forming tool and it is doing just as effective work as before, with a saving of 4 lb. 14 oz. of steel.

Fig. 2 shows a boring tool. The total weight of this tool is 9 lb. 6 oz. The saving here is 8 lb. 10 oz.

A mill roll turning tool is shown in Fig. 3. The high speed steel tip cemented onto this tool weighs 1 lb. and effects a saving of 13 lb. of high speed steel.

An i.d. radius tool is shown in Fig. 4. The complete weight of this tool is 3 lb. The high speed steel tip weighs only 2 oz., but does just as effective work as if made completely of high speed steel.

Fig. 5 is a sample drill, such as one might find in most any steel mill, used to prepare drillings for the chemical laboratory. The total weight of this tool is 10 oz. The cutting part of the tool weighs 2½ oz. and is butt-cemented.

Fig. 6 is a billet chipping tool, weighing a total of 3¾ lb. and has a high speed steel tip that weighs ½ lb.

The reamer blade in Fig. 7 weighs 1 lb. 10 oz., while the high speed steel tip on this tool weighs only 1½ oz.

Fig. 8 shows a double end chamfering tool, total weight 2¾ lb. with a 5 oz. high speed tool tip.

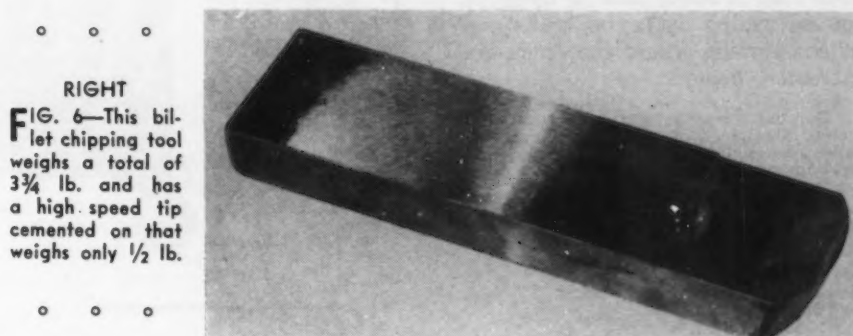
The procedure for cementing high speed steel tips to carbon shanks is comparatively simple and the cost is nominal. A pound of Cinch steel cement costs \$5 to \$6 and will cover 350 sq. in. First of all, machine or grind the surface to be cemented until it is clean and flat. It does not have to be especially smooth. Then paint the contact surfaces with copper sulphate solution.* While the surfaces to be cemented are still moist, sprinkle on about 1/32 in. of Cinch steel cement. A common salt shaker is handy for the purpose. Next put the tip in place on the shank and press firmly into position with the fingers. Set the tool aside for an hour or more, after which the tool can be handled without danger of knocking the bit out of position.

Now place the tool in a preheat furnace at 1500 to 1550 deg. F. Bring up thoroughly to heat. The

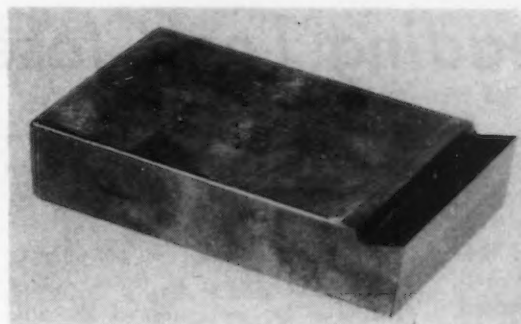
transfer to a high heat furnace, using the temperature that is specified for a solid tool made of high speed steel. When the entire tool has been brought to heat, remove carefully from the furnace, quickly squeeze out the excess cement in a small press or by tongs, making sure the tip is properly seated.

Then allow the tool to cool in air or oil. The best practice is to sim-

An interesting test was conducted in the Timken plant to determine the temperature at which high speed steel tips could be easily removed from the shank material. A sample was tested at 100 deg. F. intervals, starting at 1700 deg. F. and holding at these temperatures for 20 min. and then trying to remove the tip by impact. The two pieces were very tight up



RIGHT
FIG. 6—This billet chipping tool weighs a total of 3¾ lb. and has a high speed tip cemented on that weighs only ½ lb.



LEFT
FIG. 7—The reamer blade pictured weighs 1 lb. 10 oz., while the high speed steel tip on this tool weighs only 1½ oz.



Fig. 8—Double end chamfering tool, showing how the high speed tips are applied.

ply lay the tool to one side and let it cool off to about room temperature. Then draw the temper as specified for the type of high speed steel used in the tip. At Timken it has been found convenient to use jigs in a quick-acting foot treadle press to squeeze out excess cement.

Any high-heat furnace which has a gas-air protection curtain, or uses a prepared atmosphere, is suitable for heating. The curtain or prepared atmosphere will prevent excessive blistering.

to 2300 deg. F., the steel being deformed by the hammer blows without a sign of breaking away. At 2350 deg. F., however, the high speed tip was easily removed from the shank by a single hammer blow.

Fig. 9 is a photomicrograph (100 diameters) which shows how the cementing material penetrated into the grain boundaries of the coarsened grain of the SAE 4340 steel shank. The light area at the top of the photomicrograph is the

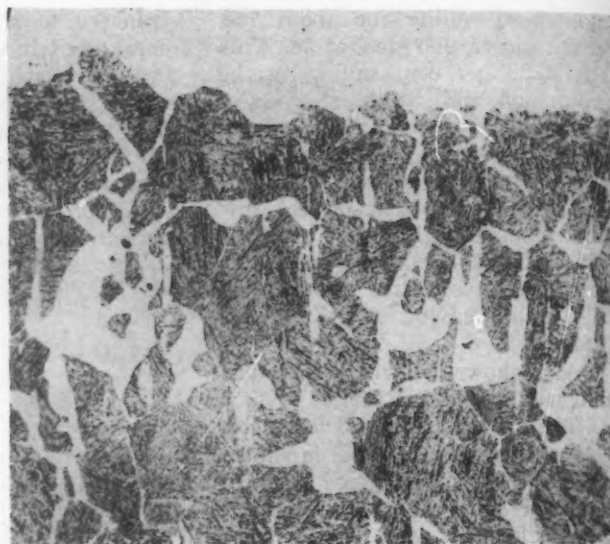
unetched 18-4-1 high speed steel tip.

It is being conservative to say that two-thirds of the tool inserts Timken is using come from the scrap pile. They consist of short bar ends of high speed steel, annealing and cutting inserts from used tools, and various other odds and ends.

For most tools, a medium carbon steel—SAE 1045—makes satisfactory shank material; however, SAE 4340 steel is being used on tools for rough turning on boring mills and billet chipping where the feeds are extremely heavy.

* For the copper sulphate solution mentioned, dissolve 3 oz. of copper sulphate (blue stone) in 1 pt. of water and add 10 drops of concentrated sulphuric acid.

FIG. 9—Microphotograph (100 X) showing how the Cinch steel cement has penetrated into the grain boundaries of the coarsened grain of the SAE 4340 steel shank. The light area at the top of the microphotograph is the unetched 18-4-1 high speed steel tip.



Avoid Threading Too Close to Shoulders

DIE head manufacturers are finding that the life of thread chasers is being seriously shortened because an increasingly large proportion of shops doing war work are specifying screwed and threaded parts with a full thread closer to the shoulder than is practical and are not giving proper consideration to the manufacturing difficulties of carrying out such specifications.

Threading close to a shoulder requires die chasers with short chamfers or throats, which are invariably special tools. Accurate threads are more difficult to produce with short chamfer chasers, and the finish produced is not as good, especially when threading stainless steel, chrome nickel and many other alloys used in war work. Hitting the shoulder when trying to cut close to the shoulder is the chief cause of chaser breakage and this means lost time and a waste of vital tools. Chasers with short chamfers or throats have a greater tendency to chip or break when cutting. They also have much less chaser life per grind and require slower cutting speeds. Less production results from these factors and from the more frequent down-

time from changing chasers frequently. Furthermore more scrap work is produced due to the poor finish obtained.

Whenever possible, do not specify full threads closer to the shoulder than $2\frac{1}{2}$ or preferably 3 threads. Make it possible to use chasers with chamfers at least $2\frac{1}{2}$ threads long for efficient cutting. This results in a chamfer angle of about 25 deg. The more threads intersected by the chamfer angle or throat, the better the distribution of chips, resulting in better finish on the work and longer tool life. The table below shows chip thickness for different chamfers or throats.

Chamfer or Throat Angle, Deg.	Chip Thickness, In.
45	0.0177
30	0.0125
20	0.0086
15	0.0065
12	0.0052
10	0.0043

Based on 10-pitch A.N. form

Where screws must be assembled into tapped holes close to the head, the screw should be necked or recessed a distance equal to $2\frac{1}{2}$ threads or more. The neck will not

materially weaken the screw because the bottom is only slightly below the root diameter of the thread. A bevel of 30 deg. on the thread side of the neck is recommended so that the thread will blend better with the neck, thus not only improving the appearance, but also permitting longer chamfers on the threading tools.

Another way in which to avoid threading close to a shoulder is to counterbore or at least countersink the tapped hole or to use washers.

Where screws requiring full threads close to a shoulder are already in production, the design can be changed to permit a neck or recess or a wider neck than that formerly used without interfering with the interchangeability of the parts.

Another condition that is hurting the war program is the hundreds of special thread sizes that are being specified. These require not only special chasers, but also special taps and special gages, which are more expensive and more difficult to obtain on a delivery basis. Thread sizes should always be selected from National Bureau of Standards Handbook H-28, 1942 (Screw Thread Standards for Federal Services).

How to Identify Alloy Steel Scrap

By L. P. TARASOV

Norton Co. Research Laboratories,
Worcester, Mass.

THE present shortage of most of the elements which go into alloy steel makes it highly desirable to classify steel scrap according to its alloy content as far as it is economically feasible. The most direct way of accomplishing this in a manufacturing plant is, of course, to segregate the different types of scrap as soon as they are produced so that their identity is not lost. This, however, is not always feasible.

In a scrap yard, the various kinds of alloy steel are even more likely to be mixed up, depending on the sources from which the scrap is obtained. Were it not for its prohibitively high cost, chemical analysis would naturally be the most reliable method of classifying steel scrap. The next best method is spark testing, which, even though

To encourage segregation of alloy steels according to alloy content, the Office of Price Administration has provided premiums for the Cr and Ni content of steel scrap in Price Schedule No. 8. See THE IRON AGE Price Guide, published with the issue of Feb. 12.

it is in no sense a substitute for chemical analysis, is often capable of furnishing enough information for the purpose of classifying scrap according to its alloy type.

The use of grinding sparks to identify steels is a well established method and has been employed in steel mills for a number of years. Most of the materials published concerning spark testing have stressed its possibilities when carried on under the most favorable conditions, such as those existing in a steel mill where a thoroughly

... Possibilities and limitations of spark testing as a means of identifying various types of steel scrap in consumers' plants, as well as scrap dealers' yards, are discussed here. Spark characteristics of steels containing C, Cr, Ni, Mn, Mo, Va and W are described in detail.

trained man spends all his time spark testing.

It is the purpose of this article to show what can reasonably be expected of spark testing when used under the less favorable conditions likely to occur when classifying scrap.

Equipment Required

Very little equipment is needed for spark testing of steel scrap—a portable grinder (preferably a light one), a pair of safety goggles, and a set of standard samples of steels of known composition. An example of the type of grinding equipment found suitable for spark testing is a portable grinder shown in Fig. 1, which weighs only 3 lb. and operates at 12,000 r.p.m. from a 110-volt a.c. circuit.

The wheel should be hard enough to wear reasonably long and yet soft enough to retain a free-cutting face. A 46-P Norton Alundum

wheel, 1½ in. in diameter and ¼ in. thick has been found to be satisfactory. The exact specifications of the wheel are not important, but it is best to keep to a single type of wheel once a suitable type is found, because the details of the spark stream are affected somewhat by the wheel specifications. In choosing a grinding wheel, it is important to make sure that when normal pressure is exerted the peripheral speed is at least 4000 ft. per min.; otherwise the spark is shorter and duller than desirable.

A stationary grinder can be used just as well as the portable model in those cases where all the scrap is in pieces small enough to be handled conveniently without the necessity of cutting off samples, or where the scrap can be easily brought to the machine.

It is obvious that even a strong spark stream will be almost invisible in bright sunlight, but there

Reclamation and Conservation of Metals

... This is No. 4 of a series of articles designed to aid industry obtain the utmost value from every pound of metal.

is no need of going to the other extreme of spark testing in the dark. If the light where the spark testing is being carried on is too strong, as may be the case in a scrap yard, a few large screens of black cardboard or cloth will cut the light intensity down sufficiently.

In general, diffused daylight and a fairly uniform background are all that is needed. Safety goggles should, of course, be worn for protection of the eyes. Lightly tinted ones are recommended when spark testing is more or less continuous, but the ordinary untinted variety will do when only a moderate amount of testing is done.

Spark Identification

Of great importance in spark testing is a good set of specimens of known composition which will serve as standards both for learning to identify the various types of sparks and for comparison with scrap of unknown composition. Use of such standards is the only practical way of classifying scrap by means of the spark test. The more complete the collection of standards, the more closely and accurately can the scrap be classified.

The kinds of steel that should be represented in such a collection will depend on the nature of the scrap to be spark tested, but it should in any case include a set of plain carbon steels, as the spark due to carbon is generally the most pronounced feature in the spark stream.

As for the other types of steel, a scrap yard can probably make use at one time or another of all those mentioned in this article while a manufacturing plant processing only a few steels would need samples of just those few.

Although many photographs and sketches of various spark streams have been published (see references), they are not by themselves of much help in classifying steels. The difficulty lies in reproducing in black and white a very large number of rapidly moving and overlapping sparks, each of which may vary along its length in intensity, color, and shape. Photographs are often quite misleading because they fail to show what the eye sees clearly and at the same time they bring out without any trouble what can hardly be detected visually.

Sketches usually have an even poorer resemblance to the spark stream and the best ones are those which are obviously schematic, drawn to call attention to some de-

tail for which the observer should look when testing a sample of the steel. Hence, classification of scrap by spark testing can be done properly only by comparison with actual sparks of known standards and not by comparison with pictures of sparks.

Spark Stream Features

When a spark stream is studied carefully, it becomes apparent that it consists of a large number of sparks of various lengths which look alike except for size, all the details being roughly in proportion to the spark length. A spark is here understood to mean not only the main shaft or carrier line, but also any bursts and other details which may develop from it.

The sketches appearing in this article show how these individual sparks look. The details of a spark stream can often be seen better by reducing grinding pressure so that there are fewer overlapping sparks. Another place to look for details is in the occasional sparks which cling to the wheel for part of a revolution before being thrown off. In this case there is no background of sparks to obscure the details.

In classifying steel scrap, the alloying elements which are important, either because of current shortages or because of their influence on the spark stream, are carbon, manganese, nickel, chromium, molybdenum, vanadium and tungsten. Although the presence of some of these in the steel can be easily determined by the spark test, others may be much more difficult to detect.

The effects described in this article are limited to those which can normally be noticed by a person with but a moderate amount of experience in spark testing. For more detailed information, the reader is referred to several articles¹⁻⁶ which discuss the less easily discernible effects of these elements on the spark streams.

It should be pointed out, however, that there is a lack of agreement concerning the identification of certain elements by means of the decidedly minor effects which they are said to produce in the spark stream. Where this is the case, the doubtful spark characteristic can hardly be used in the classification of steel scrap.

Effects of Carbon

Even though carbon has no intrinsic value in scrap, its effect is so pronounced that it is necessary

to know what the sparks from plain carbon steels look like before it is possible to study the effects of other elements. In order to see how the spark develops with increasing carbon content, it is advisable to include wrought iron as the initial member of a group of plain carbon steels.

The spark stream of wrought iron consists of long, moderately bright carrier lines each of which thickens strongly at the end and is followed by a fairly dull arrowhead that is separated by a small gap from the rest of the spark. A typical spark is shown schematically in Fig. 2, the details being drawn approximately full size to reveal them clearly, but only a short length of the carrier line is shown.

When the carbon content is increased to 0.20 per cent, as in machine steel, the carrier lines end in forks Fig. 3, while the arrowheads are barely detectable. The carriers are white and somewhat brighter than for wrought iron. With a further increase to 0.35 per cent carbon, the forks become complicated enough to be called bursts, Fig. 4, and the stream becomes even brighter with the result that the thickening of each spark near its end is no longer visible. As the carbon continues to increase, the stream gets brighter and the bursts more pronounced up to about 0.60 per cent carbon. Beyond this point the stream becomes somewhat duller in color while the intense bursts become smaller and more complicated in structure.

Manganese

The effect of manganese is quite similar to that of carbon in that a moderate increase of manganese increases the volume of the spark stream and the intensity of the bursts. A steel containing more than the normal amount of manganese sparks very much like a higher carbon steel with a lower manganese content. As an example, the spark streams of SAE 1055 and SAE X1335 are difficult to tell apart.

In the amounts found in the SAE steels, nickel can be recognized only when the carbon is low enough so that the bursts are not too prominent. The distinguishing mark is a short, sharply outlined dash of brilliant light appearing near the end of the carrier just before the fork, as shown in Fig. 5. Consider-

able experience is required to distinguish between these sharp dashes and the more rounded bulges appearing in some nickel-free steels.

A more satisfactory method of identification for those who are willing to take a little trouble is the chemical spot test, which is very simple to use once the solutions have been prepared. Details

content. As is well known, 18-8 is non-magnetic, while the straight Cr type is magnetic. Another interesting case is that of a Cr die steel containing essentially 12 per cent Cr and 2 per cent C. This sparks about the same as carbon tool steel except that the stream is only one-third as long.

The characteristic by which small



Fig. 1—Spark testing a piece of carbon steel scrap

of this spot test are described by Gordon and Reid⁴.

Steels containing 1 or 2 per cent Cr do not present any features in the spark stream that could serve to classify scrap with respect to this element. When Cr is present in large amounts in steel, it reveals its presence by markedly shortening the length of the spark stream without appreciably affecting its brightness. Other elements which shorten the stream to the same extent also make it thinner and duller.

Three types of high-Cr steel are worth mentioning at this point. The 18-8 type of stainless gives a spark much like that of wrought iron, except that it is only half as long. The spark stream of another type of stainless, 14 per cent Cr, no Ni, is an abbreviated version of the low carbon steel spark. It is well to check either kind with a magnet inasmuch as the difference between the two sets of sparks depends a great deal upon the carbon

amounts of molybdenum can be recognized in steel is the detached arrowhead, much like that of wrought iron. This can be seen even in the presence of fairly strong carbon bursts. The chief advantage of being able to recognize Mo in small amounts is that such steels are likely to contain either Ni or Cr or both. Mo high speed steels are discussed briefly in connection with W.

Vanadium

Although some vanadium steels show detached arrowheads at the ends of the carrier lines similar to those arising from Mo, only much fainter, this feature is not positive enough to identify scrap steel as containing or not containing V.

Tungsten is the simplest of all to recognize because of the dull red color imparted to the spark stream, especially near the wheel. Two other important effects are the shortening of the spark stream and the decrease in size or even the complete

elimination of the carbon burst. In studying the W spark, it is easiest to follow the changes by starting with a high speed steel of the 18-4-1 type and progressing to steels containing smaller amounts of W. The 18-4-1 spark stream consists entirely of moderately long dull red carrier lines, the C burst being completely suppressed. Dropping W to 10 per cent or so causes short curved orange spear points to appear at the ends of the carriers, as in Fig. 6. With a further decrease in W, small white bursts appear at the base of each spearpoint (see Fig. 7). The carrier lines may be anything from dull red to orange, depending on the other elements present and provided the W is not too high.

The substitution of part of the W in high speed steel by Mo causes the spark stream to turn orange, but this change in color can also be caused by elements other than Mo. Because of the many easily distinguishable variations in the spark stream, the different types of high speed and other tungsten steels can be easily sorted.

It may be well to point out that a reddened spark does not of itself indicate the presence of W. The spark streams given off by cast iron and by some of the heat and corrosion-resistant alloys also have a red color but there is enough difference in the other characteristics to prevent the spark tester from making a mistake provided standard samples are available for comparison.

Classification

The extent to which alloy steel scrap can be classified by spark testing depends a great deal upon how much is already known about the kinds of steel of which the scrap is composed. At one extreme, the scrap to be classified may consist of many types of iron and steel, alloy and otherwise, of unknown composition. At the other extreme, the scrap is limited to only a few definite types.

Even when nothing is known about the make-up of the scrap, it can be classified roughly by sparking into the plain carbon and low alloy group (mostly SAE steels), the stainless group, and the tool and die steel group. The first two groups, excluding the carbon steels, comprise the two principal categories in the scheme suggested by

the WPB several months ago for the segregation of alloy scrap.*

*For details of this segregation program see THE IRON AGE, July 17, 1941, p. 104.

The outstanding difference between the spark streams of these

spark test alone, other tests can be used to advantage. If the spark test indicates that the steel is stainless, the fact that it is non-magnetic will show it to contain over 7 per cent of nickel, other types of stainless being magnetic.

If it is magnetic, then the spot

There is unfortunately no reliable way of separating the low alloy types of steel from each other, or from plain carbon steels, by spark testing unless it is known that the scrap consists of certain definite steels. As this is the case in the average metal processing plant, spark testing remains a very useful method of classifying even the low alloy steels. In these circumstances, the carbon content of the various steels is likely to vary enough so that at least several of them can be identified solely with reference to the carbon spark. It is obviously important here to spark that portion of the sample which has been neither carburized nor decarburized.

If a further separation is necessary, it can often be accomplished on the basis of Mo or Ni content. In the latter case, it may be advantageous to spark the decarburized region, if that exists, in order to bring out the characteristic Ni spark, or else the chemical spot test can be used. It is also often possible to distinguish between the sparks of two steels without being able to assign any details to a particular alloying element. It is perhaps worth repeating here that, as is always true of spark testing, the best results are obtained by checking the sparks from the scrap material against those observed with the standard samples.

Stainless Scrap

When stainless scrap is to be segregated by spark testing, better results are also obtained if it is known what kinds of stainless the scrap is restricted to. In this case, however, the narrow C range impedes the use of the C spark to segregate the different varieties of stainless in the manner indicated for the low alloy steels.

Tool and die steels do not require any lengthy discussion as they are considerably easier to classify by comparison with known standards than the stainless or low alloy types. This is because of the many forms that the spark stream can take when W is present, as it often is in these steels. In its absence, other characteristics can be easily distinguished, such as the comparative lengths of the sparks from high C-high Cr steel and from carbon tool steel.

To summarize, the proper way to segregate alloy steel scrap is to do so before its identity is lost. In this case, spark testing is useful mainly



Fig. 2—Wrought iron spark. The carrier line thickens at the end, followed by a detached arrowhead.



Fig. 3—The carrier line in a spark from 0.20 per cent carbon steel ends in a fork.

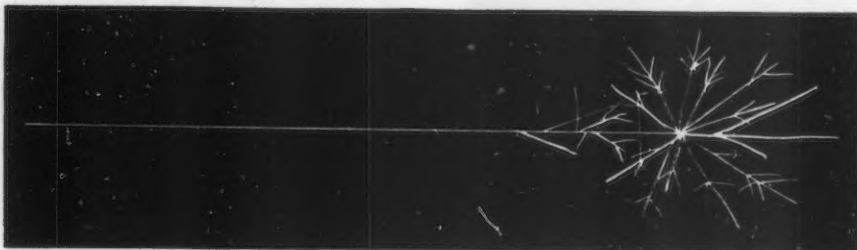


Fig. 4—Increasing carbon alters the spark characteristics. The fork in this 0.35 per cent C steel has developed into a burst. Compare with Fig. 3.



Fig. 5—The dash in this carrier line is due to nickel. The spark is from a 2 per cent nickel steel, low in carbon.



Fig. 6—The carrier line in this high tungsten die steel ends in a spear point.



Fig. 7—Low tungsten die steel sparks are characterized by a fine structure burst in addition to the spear point. Compare this spark with Fig. 6.

groups is that stainless sparks are much shorter than those coming from low alloy and carbon steels, while most of the tool and die steels show the characteristic features associated with either a W or a high Cr content.

The stainless steels are further subdivided in the WPB scheme according to whether they are Cr-Ni or Cr base alloys. As it is difficult to make these distinctions by the

test for nickel will show whether it is a Cr base alloy or a Cr-Ni type containing up to 7 per cent Ni. Scrap steel can also be roughly graded with respect to C if a fairly complete set of stainless steel samples of known composition is available. Stabilizing elements like Ti and elements added for machinability, such as S, cannot be detected by sparking.

as a check. When for any reason it is not practical to segregate it in this manner, the scrap can be sorted by spark testing, supplemented by magnetic and spot tests when necessary, with considerable accuracy provided the knowledge of what steels are contained in the batch of scrap has not been lost. Finally, scrap of completely unknown antecedents can be classified only into a few major groups by spark testing, and under these cir-

cumstances this method is valuable primarily in connection with high alloy steels, such as stainless.

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High Altitude Aircraft Operation Studied By Germany

ONE of the subjects of intensive research in Germany at present seems to be operation of aircraft at high altitudes. Arado, Dornier, Focke-Wulf, Heinkel, and Messerschmitt are experimenting with pressure cabins. An unusual design of a pressure cabin, for use on a modified Focke-Wulf Kurier, provides each member of the crew with a small, individual pressure chamber connected to the others by air lofts.

Other research trends include submerged engine installations and shaft drives. Two new types of propellers are being developed at Dornier. Both types have metal roots from which sprout four thin ribs, two forming the leading and two the trailing edges of the blade. In one of these types, the blade is built up on a framework similar

to a stressed skin wing, with metal ribs and metal covering, and is welded throughout. The possibility of plastic coverings instead of metal for propeller blades is also being examined.

There are several recent developments in German aircraft, in so far as engine design and position have been made. The Heinkel He 177 long range bomber is fitted with two D.B. 606 engines, with four blade propellers driving through a short shaft. The Heinkel single seat fighter has a D.B. 606 engine built into the ship in the same manner as Bell places the Allison engine in the Airacobra.

Two projected Messerschmidt designs will use the D.B. 606 engine or modified forms of it. The first is a two-engine monoplane and the second is a four-engine bomber. In

the four-engine design, the inner unit of each pair of engines is mounted in the fuselage and the outer unit is an enlarged fillet of the center section of the wing. Such an arrangement suggests that the design may be a tailless type plane.

German reports also speak of research work on the design of a steam engine for aircraft use, again with high altitude operation in view.

Junkers is studying the problem of transporting light tanks, field guns, and armored car by air. Modifications of the Junkers Ju 52/3m transport are unusual in that the rear part of the fuselage is hinged and can be lowered to allow whippet tanks, 10 and 15 cm guns, and other land pieces to be driven into the ship without dismantling.

Machining Aided by Chemical Reactions

THE results of a Russian investigation in which was studied the influence of aqueous solutions of different electrolytes on the rate of grinding various metals were presented and discussed by A. Behr, in the November issue of *Metallurgia*. The tests established conclusively that chemical reactions can make a valuable contribution to the efficiency of machining operations. A glass disk driven by a constant speed motor was used as a grinder, and a suspension of carefully fractionated emery powder in water or in an

aqueous solution of an electrolyte was applied as the abrasive.

The amount of metal ground away in a given time was determined by weighing and the frictional force between the disk and the metal was measured by a dynamometer. Results when grinding iron showed that the metal ground away varied considerably with each electrolyte, whereas the friction only varied within narrow limits. The grinding rates were greatest with solutions of $K_2Fe(CN)_6$, $Fe_2(SO_4)_3$, and $CuSO_4$. It was observed that the iron sur-

face ground in these solutions did not differ from the surface ground in water.

However, in grinding stainless steels, it was found that the amount of metal ground away did not vary very much with a change of solutions, but the most effective electrolytes were KI and $K_2Fe(CN)_6$. An investigation was made as the grinding of sintered tungsten carbide, and it was discovered that the use of electrolytes speeded up the grinding rate very greatly. The highest rate obtained was with a solution of $HgNO_3$.

... Blast Furnace Air H

THE practice of utilizing blast furnace stoves to heat air in the steel industry is evidence of their universal acceptance and satisfactory performance. It is doubtful, however, whether those familiar with the advancement made in the fields of heat transfer, metallurgy, refractories, fuel combustion, and air compression subscribe to the belief that the system of heating air to high temperatures by blowing it through preheated refractories, as in the blast furnace stoves, is the most practical.

These stoves are units of heat transfer equipment and when compared with the newer concepts of heat transmission they are found to be very inefficient. The heat transfer coefficients from the hot gases of combustion to the brick work and from the brick work to the air are very low. The deposition of dust and soot over the refractories and throughout the flues results in a further reduction in the heat transfer coefficient and a corresponding loss in efficiency. The interrupted stream of air at variable heat intensity is undoubtedly an inherent disadvantage which has been accepted as the best obtainable. That a continuous supply of heated air at controlled temperature would be more desirable cannot be denied. Scientific advancement has developed new theories in the combustion of fuels, extensive knowledge relative to heat absorption and materials capable of withstanding elevated temperatures and pressures. It is entirely possible that these new devices can be used to advantage in the equipment for heating air to high temperatures. Modern furnaces can be designed to utilize these progressive accomplishments and it would therefore seem an appropriate time to investigate the possibilities of adapting externally fired, direct heating, tubular air heaters for blast furnace application.

The suggestion of heating air to

temperatures around 1500 deg. F. in tubes immediately recalls the experience of many engineers and plant operators who have seen steel or cast iron tubes burn out even at lower temperatures. The thought of using the high temperature resisting alloys instantly conveys the idea of prohibitive expense. However, it is only necessary to exercise skill in design and controlled operation to show that tubular heaters are practical. A lengthy discussion of the advantages and disadvantages of tubular heaters may be unnecessary. The feature of most importance is that tubular units offer the opportunity to obtain high heat transfer coefficients and therefore a reduction in heating surface and materials of construction.

These heaters, by reason of improved heat transfer rates, occupy much less space than the conventional heating stoves, and the simplification of duct and control systems is possible. Operating interruptions for the removal of dust may be reduced, and the cleaning problem is simplified by the availability of continuous or cyclical automatic soot blowing equipment. The continuity of the blast stream and the possibility of maintaining uniform temperatures offer numerous economies in the performance of the blast furnace.

Disadvantages of Tubular Heaters

The disadvantages in the tubular heaters are costs of heat resisting materials, the additional operating costs resulting from the necessity of compressing the air to the pressure required to force the air through the tubes, and the installation of induced draft fans to exhaust the gases of combustion. Since large quantities of blast furnace gases are usually available as fuel, it is possible to design an economical system of air heating and steam generation, with proper consideration of the driving requirements for fans and booster compressors.

The variable temperature gradi-

ents obtained in a group of blast furnace stoves during the alternating cycle of heating the air by forcing it through the preheated bricks and heating the refractories with a stream of combustion gases can be improved by the use of tubular heaters. The low, overall heat transfer coefficients obtained in the stoves account for the number and size of the stoves required. The tubular units, therefore, provide interesting possibilities, either for partial or total elimination of blast furnace stoves.

It is possible that, in speaking of externally fired tubular air heaters, some conflict of understanding may prevail because of differences in terminology in various industries. Tubular heaters convey the idea of closed type heat exchangers such as used extensively in the petroleum, chemical, and many other industries. In contrast, externally fired heaters as discussed herein are analogous to steam generators and boilers, and to the pipe stills used in petroleum refining. They consist of combustion chambers and tubular heat-absorbing surfaces in various arrangements suitable for individual requirements. In general, they are designed for the best arrangement of tubular surface to absorb heat from the products of combustion by the most effective use of the three mediums of heat transfer, namely, radiation, convection, and conduction. Fuels are burned in the combustion chambers and the heat is transferred to the fluid being heated through the walls of the heating elements.

The principles of combustion in all direct fired heaters are the same regardless of whether fuel is being burned in a boiler to make steam, in a pipe still to refine petroleum derivatives, or the heating of air for blast furnaces. The construction of furnace settings is likewise similar, and modern installations make effective use of light weight insulating refractories enclosed in steel casings. There is a tendency to depart from the heavy brick wall

Air Heating . . .

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construction, the petroleum industry in particular having used the method of steel encased insulating refractory settings for years. In fact, a pipe still in the petroleum industry without this type of construction would be regarded as obsolete and uneconomical. Similar advantages are apparent for the use in air heaters for blast furnace work.

The fundamental principles of heat transfer are applicable in heating fluids whether they are in liquid, vapor, or gaseous states, or in intermediate states as in mixtures. The design of heat transfer equipment requires practical experience as well as theoretical knowledge of the flow of fluids, the principles of combustion, heat transfer, and metallurgical limitations.

Tubular Heating Problems

A consideration of the problems involved in heating air in tubular units leads to the conclusion that the most practical design will follow the experience gained in petroleum pipe still practice. A number of types of stills are in service and they all embody the use of combustion chambers, radiant heat absorbing sections and convection heating sections. In arrangement, they are single or multi-compartment box types or cylindrical in shape. The tubular heating elements are usually disposed around the combustion chambers, beneath roofs, on floors, and along walls, thus effecting maximum heat transfer rates through the medium of radiation. To effect greater economies and under certain physical and chemical conditions regulated by the characteristics of the medium being subjected to heat, convection sections may be preferable. In this system, the heat is transferred mainly by convection and conduction resulting from the passage of the products of combustion over the external surfaces of tubular elements, although, depending upon the temperature ranges, considerable heat may be delivered

... Adaptation of tubular heating for blast furnace air, along with technical data required for such installations, is discussed in this series of three articles. While such an installation would be a major undertaking for a blast furnace operator, further laboratory and pilot plant investigations are likely to show its feasibility.

through the medium of radiation from the heated gases and surrounding refractory surfaces. Such radiant heat may be regarded as secondary radiation compared to the primary or direct transfer in combustion chambers.

Service conditions are usually suitable for the utilization of radiant heat accompanied by high heat transfer rates and minimum heating surface. Convection sections are frequently used for preheating, soaking (time delay), or steam super-heating. They may be regarded as economizer sections used to extract additional heat from the flue gases in order to obtain better overall efficiencies. In practice, these heaters are usually designed to absorb about 50 per cent of the total heat released in the radiant heating section, leaving a relatively small duty to the convection tubes. Oil heaters differ from steam boiler practice, because in heating oil the sensitivity of the oil to destructive distillation, cracking within the tubes, and the formation and deposition of coke are controlling features not encountered in making steam. The tubes become locally overheated when coke is deposited and failure occurs. The designer of pipe stills must be familiar with maximum transfer rates permissible for the various oils being heated, and a broad knowledge of phase equilibria and the correlation of time, temperature, pressure, and vaporization is indispensable. The heat release per cubic foot of furnace volume in petroleum stills is very low compared to heat released in steam generators. This usually results in comparatively larger com-

bustion chambers and more expensive furnace settings.

Conditions similar to those in oil pipe stills must be considered in tubular air heaters. Air is a poor conductor of heat, its thermal conductivity being low compared to liquids. In heating air as it is flowing through a tube, a high laminar insulating effect exists even in high turbulent ranges. The result over a typical cross-section of an air heating element is a sharp rise in the temperature gradient from the main body of air to the inside wall of the tube, a small temperature rise through the wall of the tube due to the relatively higher conductivity of metal, and another sharp rise in passing through the insulating film of gases to the main volume of the products of combustion. An intermediate film of oxide and carbon deposits must also be considered as fouling factors on the flue gas side.

Tubing Materials

Tubular heaters for heating air to temperatures around 1400 deg. F. necessitate the use of alloy tubes in the terminal ranges of high temperature. In the case of the radiant type heater, they must be in the combustion chamber section for purposes of economy. A convection-type heater might therefore appear to be more practical since the tubes will be exposed to less destructive conditions, but a substantial increase in the required amount of tubular heating surface would result. An advantage of the radiant type heater and one resulting in considerable saving, is that smaller combustion chambers may be used and heat releases more

comparable with steam boiler practice are possible.

The application of the theories of combustion and heat transmission to air heater design deserves some mention of the literature on these subjects. A comprehensive bibliography of publications reviewed in the preparation of this work is appended. All references cannot be treated individually, but some that have been used extensively are as follows: The works of McAdams,²² Nelson,²⁵ Fishenden and Saunders,²⁶ Etherington,⁴⁰ and Stoever,⁵⁰ covering the fundamental principles of heat transmission. The evolution of a number of formulas for determination of radiant heat absorption rates and the percentage of heat absorbed by radiation relative to total heat liberated in the combustion chambers of steam boilers are effectively treated in the works of Wohlenberg,^{1, 6, 10, 28, 29} Bailey,⁴ Artsay,⁷ DeBaufre,¹⁴ Philo,¹⁰ Croft,³⁵ and Mulliken,³⁷ and similar data on petroleum pipe stills are by Wilson, Lobo and Hottel.¹⁷ A review of these formulas and their usefulness in the design of pipe stills for the petroleum industry is presented by Lobo and Evans.⁴⁴ The basic theory of radiant heat transmission contributed by Hottel^{2, 15, 17, 20, 45} and his associates is extremely valuable in the design of heaters of many types and particularly important in direct fired tubular air heaters. In the design of heaters of the convection type or convection sections of combined radiant and convection type units, the work of Monrad,¹⁸ Pierson,³¹ Hoge,³² and Grimison,³³ should be found useful. The papers by Sherman,²⁴ Trinks,³⁰ Campbell,⁴⁸ and Hottel and Egbert⁴⁶ are extremely important in combustion technology and the text on combustion⁵³ is helpful in combustion calculations involving gaseous fuels.

A number of references relating to the design and performance of refinery pipe stills are included to indicate the extensive use of tubular units in the petroleum industry. Considerable advantage can be taken from petroleum practice, as this industry is outstanding in the development of tubular heaters. These and all other citations have been used extensively by the writer, but the merits of each cannot be conveniently expressed herein.

The combustion chamber surrounded by tubular heat-absorbing surfaces and refractory surfaces, and the ultimate determination of proper heat transfer rates is complicated by many variable factors.

It is fortunate, however, that sufficient data are available, supported by test results, to enable the calculation of transfer rates with a reasonable degree of accuracy.

Heat Transfer by Radiation

The problem of determining the heat transfer rate in the radiant heating section is not only one of radiant heat but is also the combination of radiant and convection heat, as an appreciable portion of the total heat absorbed results from the turbulence of the products of combustion. The amount due to radiant heat, however, is large in proportion to that transmitted by convection, as radiant heat rates vary as the difference between the fourth powers of the temperature of the combustion products and the temperature of the cooler heat absorbing surfaces. Convection heat is transferred in direct proportion to these temperatures. The convection heat component should not be disregarded, particularly in furnaces firing gaseous fuels where non-luminous flames are usually obtainable, although actual flame temperature is most uncertain.

The radiant heat transfer rates may be calculated from the Stefan-Boltzmann formula in a form modified to compensate for all of the variables. The formula convenient in the design of tubular heaters may be stated as follows:

$$q = 0.173 (\alpha A_{cp}) \phi \left[\left(\frac{T_g}{100} \right)^4 - \left(\frac{T_s}{100} \right)^4 \right] + h_c A_c (T_g - T_s) \quad (1)$$

q = net heat transferred by radiation and convection to the tubes, B.t.u. per hr.

T_g = mean temperature of the hot gases in the furnace, deg. F. + 460.

T_s = mean tube skin temperature, deg. F. + 460.

αA_{cp} = area of a plane which will absorb the same amount of heat as the actual cold surface in the furnace, sq. ft.

ϕ = an overall exchange factor correcting for flame emissivity, arrangement of the refractory, volume of the combustion chamber, etc.

h_c = convection coefficient, B.t.u. per hr. per sq. ft. per deg. F.

Heat Treatment by Convection

It will be noted that the first part of this formula expresses the amount of heat transferred by radiation, and the second part, the additional amount absorbed by convection resulting from the turbulence of the gases in the combustion chamber. Selection of proper values to be used in the equation involves considerable experience. Some assumptions must be made and the accuracy must be

checked after the formula is solved. Repetition of the procedure must obviously be followed when results vary too greatly from assumptions. Many factors, however, may be taken from published charts and tables based on reliable scientific investigations.

The determination of the factor T_g involves considerable discussion and will be treated later. The mean tube skin temperature (T_s) must be assumed from experience with temperature gradients, fluid, and metal conductivity, but it is possible to approximate T_s with reasonable accuracy. The assumption may be checked by the general conception of elementary resistances involved in heat transfer between the mediums on each side of a tubular heating element. This method, usually known as the film concept of the relation between the over-all coefficient of heat transfer and the film and intermediate coefficients, is adequately covered in the several texts mentioned in the bibliography, and its use will be shown in the illustrative problem following the discussion.

The term αA_{cp} is referred to as the equivalent cold plane surface which will absorb the same amount of heat as the actual cold surface of the tubular elements in the furnace combustion chamber. The ratio of reception by the actual tubular surfaces to reception by a continuous plane, designated by the term α may be selected from the chart published by Hottel in many of the references cited.^{17, 23} It is evaluated as a function of the ratio of center to center distance between the tubes and the outside diameter of the tubes. The value of α varies with the number of rows of tubes exposed to radiant heat. The value of α for a single row of tubes, adjacent to a refractory wall, will be 0.935 for a spacing to diameter ratio of 1.67, and for a double row of tubes at the same spacing to diameter ratio and when staggered on an equilateral triangular pitch, the value will be 0.992.

The area of a continuous plane replacing the single row of tubes or the first row of a double row is given by the term A_{cp} , and is the product of the exposed tube length, the number of tubes in the row, and the center to center distance between the tubes, all dimensions being expressed in feet. The expression for the equivalent cold plane then becomes:

$$\alpha A_{cp} = \alpha (\text{tube spacing}) (\text{ex-}$$



... **T**WO of the 12 blast furnaces at the Gary Works of Carnegie-Illinois Steel Corp. The hot blast stoves shown here heat the 7000 tons of air forced into the furnaces daily.

posed length) (No. of tubes), sq. ft.

The over-all exchange factor ϕ , accredited to Hottel and expressed by Lobo and Evans,⁴⁴ is evaluated from the following formulae:

$$\phi = \frac{1}{\frac{1}{F_s} + \frac{1}{P_c} - 1} \quad (2)$$

In this formula F_s must be determined by the supplementary equation:

$$F_s = P_f \left[1 + \left(\frac{A_r}{\alpha A_{cp}} \right) \frac{1}{1 + \left(\frac{P_f}{1 - P_f} \right) \frac{1}{F_{rc}}} \right] \quad (3)$$

in which the various factors are:

- ϕ = over-all exchange factor (previously described).
- F_s = angle-emissivity factor.
- P_f = emissivity of the flame.
- P_c = emissivity of the heat receiving surface.
- A_r = effective refractory surface, sq. ft. equal to $(A_t - \alpha A_{cp})$ where:
- A_t = total area of furnace surfaces in the radiant section. (Equal to A_{cp} + refractory surfaces unprotected by tubes in sq. ft.)
- αA_{cp} = Equivalent cold plane surface, sq. ft., as previously explained.
- F_{rc} = the fraction of all the radiation emitted from all the refractory in all directions, which, if not absorbed by the gas would hit upon cold surfaces αA_{cp} .

In the problem under discussion F_{rc} may be taken as $\frac{\alpha A_{cp}}{A_t}$ which is the recommendation for values of $\frac{A_r}{\alpha A_{cp}}$ from 0 to 1.

For other ratios reference should be made to the original paper on this subject.⁴⁴

The remaining factors include h_c , which may vary from 0 to 3, depending upon turbulence in the combustion chamber. A_c needs no further explanation except that it should be calculated from the effective or exposed length of the tubes in ft.

The mean temperature of the gases in the combustion chamber is dependent upon the following conditions:

- (1). Flame temperature (theoretical).
- (2). Flame emissivity.
- (3). Surface temperature of heat absorbing elements.
- (4). Emissivity of heat absorbing elements.
- (5). Combustion chamber shape factor.
- (6). Ratio of heat absorbing surface to refractory surfaces.
- (7). Thermal conductivity.

The first of these factors, the theoretical flame temperature, is in itself subject to many variables and uncertainties. The theoretical flame temperature never prevails, varying throughout the body of the flame volume. It is different at many points because of the progress of combustion, the nature of the fuel components, the amount of excess air, the amount of air pre-heat, and the absorption and radiation losses occurring simultaneously with combustion. Flame emissivity is similarly affected and, in addition, is subject to variation with temperature, luminosity resulting from chemical reactions, incandescent particles of carbon, ash or dust, as well as variations from a homogeneous mass in the flame volume. Both temperature and emissivity are affected and subject to control within certain limits by the amount of excess air and the moisture in the air used for combustion or by the introduction of extraneous moisture. Further regulated variation is obtainable by flue gas recirculation or, when practical, the introduction of diluent inert gases.

Theoretical flame temperatures are seldom encountered as theory assumes complete combustion and in practice combustion is not always complete even at high temperatures. The temperature gradient relative to the distance of

the flame envelope away from the burner is affected by the thoroughness of mixing of the fuel, the air for combustion, and diluents. All of these are influencing factors on flame luminosity and emissivity.

Sherman,²⁴ in discussing the luminosity of flames, states that the sources of radiation in non-luminous flames are almost entirely due to the CO_2 and H_2O and due in addition to the presence of luminous carbon particles and the pyrolytic decomposition of hydrocarbons in luminous flames. His conclusions are confirmed by the observations of many other investigators.

The data by Sherman and others on the effect of hydrocarbons in the fuel on luminosity are worth consideration in the combustion of blast furnace gas. It is believed that the degree and rate of decomposition of the hydrocarbons are of importance in flame luminosity and emissivity. The saturates, methane, ethane, propane, and butane decompose more rapidly as increased carbon to hydrogen ratios exist in fuel components. The unsaturates, such as ethylene (C_2H_4) and acetylene, (C_2H_2) decompose very rapidly, but methane, (CH_4) is very difficult to crack. It is therefore most probable that non-luminous flames will be obtained by the combustion of gases having a high methane content as oxidation progresses at a faster rate than decomposition. Non-luminous combustion from clean blast furnace gas should be obtainable because of the absence of hydro-carbons in the fuel.

Editor's Note: Next week, the author will continue the discussion on blast furnace heating with tubular heaters, covering selection of tubular materials, tube spacing in the heater and the calculation of heat transfer rates single-row roof wall tubes and double-row shield tubes.

Lowering Cobalt Content of Welded Coating Alloys

AN investigation of the structure and hardness of the cobalt-chromium-tungsten alloys used as welding rods to make heat and corrosion resisting coatings, such as stellite, on steel, was recently reported in the German Archiv fur das Eisenhüttenwesen. These alloys, according to the investigation, attain their maximum hardness after cooling from a temperature of 2200 to 2372 deg F., with subsequent annealing at 1472 deg. F. for 10

to 72 hr. This is because of the precipitation of carbides.

Investigations of the properties of alloys containing less cobalt and additions of iron, nickel, and molybdenum were made. On reducing the cobalt content from 65 per cent to 27 per cent, it was found that no transformation took place on cooling, but with still less cobalt a transformation occurred at a temperature which depended on the amount of cobalt. High tempera-

ture hardness decreased with decreasing cobalt content. Nickel additions resulted in a stable non-transforming structure even with only 11 per cent cobalt and 5 per cent nickel, and decreased the hardness at both room and high temperatures.

Additions of molybdenum was promising, and 4 or 5 per cent of this element with 19 per cent cobalt produced an alloy with properties practically equal to those of any non-ferrous alloy.

Buffing Before Plating

to Improve Rust Resistance

... Tests made under regular commercial production conditions indicate that buffing before plating saves plating metal, racking, and re-racking time, and produces a plated surface with greatly increased rust resistance.

IN recent tests conducted under every day production conditions in a Chicago plating shop, it was found that buffing of steel before plating not only increases rust resistance, but effects much-needed saving of copper, nickel, cadmium and other plating metals made scarce by the demands of war.

The examinations were conducted under the supervision of E. G. Coffey of the Matchless Metal Polish Co., and Mr. Les Borchert of the General Spring Bumper Co., both of Chicago. It should be emphasized that these were not laboratory tests subject to the benefits and precise conclusions of that procedure. They were, purely and simply, experiments conducted on customers' samples, which included most of the popular types of steel and steel alloys handled under normal operating conditions. For this reason, their findings are of broad interest in these days of scarce materials.

Plating has always been the accepted method for rust proofing steel and obtaining a high finish. The steel usually has been prepared for plating by grinding or polishing on wheels set up in emery; and after plating, buffing was occasionally employed on quality jobs to improve the finish, cover up wheel marks, and close the pores. This latter accomplishment is most important, since surface roughness is recognized as one of the major causes of porosity. However, in buffing after plating it has been found that a considerable portion of the plate was removed, depend-

ing upon the wheel marks and other imperfections. Naturally, the rust resistance of the finished plate hung in the balance, determined by the amount of plating remaining on the base metal.

Since it is now necessary to save plating metals and since porosity may be sharply affected by surface roughness, buffing before plating can be used in many cases to advantage. A number of tests, notably those conducted by Walter Pinner of the Houdaille Hershey Corp., have established that better polishing results in improved rust proofing, corrosion resistance, finishing and plating. Mr. Pinner made the statement that in "a well conducted plating process far more than half of all corrosion difficulties are a result of the condition of the basis metal." In view of this, Matchless Metal Polish Co. went a step farther and buffed the steel after grinding and polishing, to remove wheel marks and other imperfections. Although the purpose was a smooth surface, the action always resulted in a brighter finish too. This step proved to be no more difficult than buffing stainless steel, brass, aluminum, or any other metal, when the proper wheels and compounds were used.

In the tests, steel of different types, shapes and sizes, ranging from highly finished to steel that required grinding and pickling, were used. In finishing the steel, the metal was often buffed out without preliminary polishing. Other pieces required a one-wheel greasing operation prior to buffing. Where more polishing was necessary, the customary emery grain, polishing compound, and the usual polishing procedure were used. Polishing was employed to bring each piece to a point where it could be buffed advantageously. Usually, the work was greased out on 150, 180, 200, or 220 grit wheels, depending on the condition of the steel and the shape of the piece; but in no case was there any excessive or undue amount of polishing. After buffing, some of the steel was left as it came from the buff; some was lacquered; and the remainder plated as indicated in Table I. None of the plated pieces was buffed after plating and all the pieces were then subjected to a 20 per cent salt spray with the results shown in Table I.

As a means of determining the value of the steel buffing, the salt spray resistance of plating on top of buffed steel can be compared to plating on steel polished in the regular manner. Many tests prove that steel finished on a regular polishing wheel set up in grain sizes ranging from 150 to 220 grit with grease and plated with 0.001 in. of nickel will stand up approximately

... FORTY-SEVENTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing.

100 hr. in a 20 per cent salt spray. This is considered satisfactory plating for automobile bumper bars. Comparing the amount of nickel plated on buffed steel, with its resulting salt spray resistance to 0.001 in. of nickel plated on polished steel, proves that less metal is required to get the same amount or more of rust resistance, when buffing directly on the basis steel.

Buffing Over Scratches

To substantiate the findings in the first series of tests, another series was conducted to determine the exact advantages to be obtained by buffing over different emery grain scratches. The results of these tests are shown in Table II. In the second series of tests, steel samples were polished with Nos. 150, 180, and 220 grain. For instance, a sample, polished with the 150 grain, was only one-half buffed. Other samples were polished with the other grain sizes and one-half of each was buffed in the same manner. In all cases, only regular

polishing and buffing procedures were used and no attempt was made to take out the scratches left by the polishing wheel, since the purpose was to determine the value of buffing over the wheel mark. The three sets were then plated and subjected to the regular 20 per cent salt spray. As Table II shows, buffing the basis metal increased the rust resistance value of the plating and the finishes showed greater salt spray resistance.

The overall result shown in the second series was that a 25 per cent greater rust resistance is obtained by buffed steel over steel finished only by any one of several emery grains under practical everyday production conditions.

Buffing Removes Slivers

As is well known, in some cases, regular polishing leaves slivers of metal sticking up that the plating covers in the form of a minute nodule. This nodule disrupts the structure of any plated surface and is a source of trouble. If the plat-

ing is buffed, this nodule is usually cut through or pulled out at such points, exposing the steel and creating the first points of rust. Buffing the basis steel before plating eliminates those troublesome slivers, and also closes the pores of the basis steel, which are another source of rust.

A familiar plating headache is the fact that the inside corner of a right-angle gets a thinner coat than the outer edge; and very often the plating will not deposit uniformly in recesses of unusually shaped pieces. If these corners and recesses are buffed before plating, it is readily seen that the thinner coating of plate would be considerably increased in rust resistance value. Where corners and recesses are buffed after plating, the metal is often cut through or reduced to a minimum thickness and is less resistant to rust.

Where bright nickel, lustrous, or bright copper is plated on buffed steel, no buffing is required later on the plating itself, and the sav-

TABLE I
Salt Spray Tests, Showing Condition of Metal at Regular Inspection Intervals

Set Number	Plating Applied on Buffed Steel	Time in Salt Spray, Hr., and Condition of Metal										
		1	16	24	48	72	96	120	144	168	192	240
1	Chrome, direct, 0.000025 in.		VNR									
1	Chrome, direct, 0.000025 in.		VNR									
2	Bright nickel, 0.0001 in. and chrome, 0.000025 in.		VNR									
2	Bright nickel, 0.0001 in. and chrome, 0.000025 in.		VNR									
3	Bright nickel, 0.0003 in. and chrome, 0.000025 in.		P	P	SR	VNR						
3	Bright nickel, 0.0003 in. and chrome, 0.000025 in.		P	P	VSR	VNR						
4	Acid copper, 0.0002 in. and bright nickel-chrome, 0.0002 in.			P	SR	SR	NR	VNR				
4	Acid copper, 0.0002 in. and bright nickel-chrome, 0.0002 in.			P	VSR	VSR	NR	VNR				
5	Acid copper, 0.0004 in. and bright nickel-chrome, 0.0002 in.								P	VSR	SR	VNR
5	Acid copper, 0.0004 in. and bright nickel-chrome, 0.0002 in.								P	P	SR	VNR
6	Acid copper, 0.0006 in. and bright nickel-chrome, 0.0002 in.								P	VSR	VSR	VSR
6	Acid copper, 0.0006 in. and bright nickel-chrome, 0.0002 in.								P	VSR	VSR	SR
7	Acid copper, 0.0008 in. and bright nickel-chrome, 0.0002 in.								P	SR	NR	VNR
8	Cyanide copper flash and bright nickel-chrome, 0.0005 in.									P	VSR	VSR
8	Cyanide copper flash and bright nickel-chrome, 0.0005 in.									P	VSR	VSR
9	Polished steel	VNR										

SYMBOL EXPLANATION
P—Perfect, no rust.
VSR—Very slightly rusty, usually minute points of rust.

SR—Slightly rusty, a few small rust spots on close examination.
NR—Noticeably rusty, not quite visible at arm's length.
VNR—Very noticeably rusty, large number of spots visible at arm's length.

ing of time required for unracking, buffing the plated surface, and re-racking is worth consideration. Where dull nickel and copper is used, the buffing on the plating to produce a bright finish is reduced to a mere coloring operation.

Lacquered Surfaces Improved

Buffed steel is also very acceptable when coated with a clear lacquer on the buffed surface. The finish is usually bright, resembling plating to a marked degree. Excellent results in salt spray tests have been obtained on various lacquers over buffed steel, ranging up to 100 hr.

Exponents of buffing argue its merits on steel parts subject to great strains, such as airplane parts. In plane motor parts, for instance, scratches or similar de-

fects are stress raisers which ultimately may lead to fatigue failure of the metal. Experiments in motor plants have shown that buffing eliminates many of these fatigue points and imparts a much better surface. This makes for casier lubrication and helps keep parts free of foreign substances that might attach themselves to the metal. A number of such tests on motor parts are now being conducted but complete results are not yet available.

Buffing steel is no different than buffing any other metal and can be compared favorably to buffing stainless steel as to both procedure and cost. Compositions and buffs are made especially for buffing steel, and wherever possible, speeds of 10,000 to 11,000 surface ft. per min. are recommended.

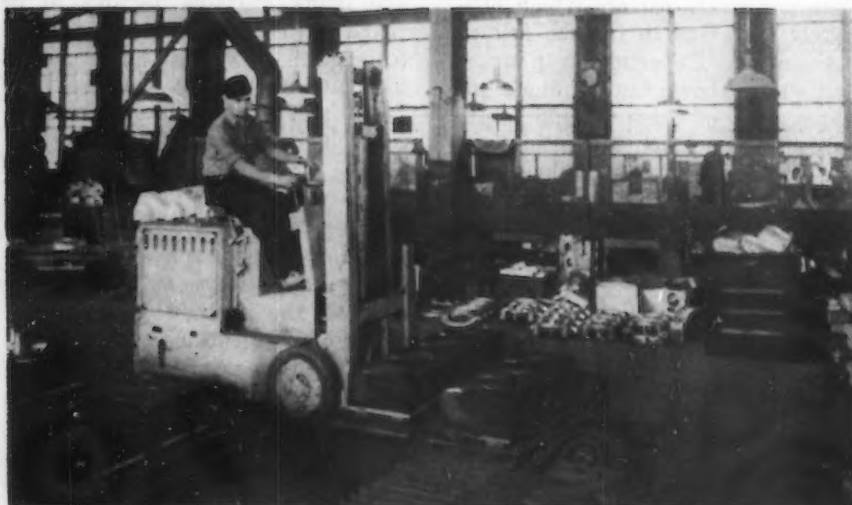
It should be realized that there

are many variable factors to be taken into consideration in these tests, such as variations in polishing, buffing, plating processes and in the steel itself. These cannot be controlled and variance in the salt spray resistance will result naturally.

Some firms have been buffing steel for years on quality jobs. Recently, a great many more have adopted the method on a wider range of applications. It has been found that costs are not increased, buffing in some cases being more economical when the savings of plating metal, racking, and re-racking time are considered. Another cost reducer is available when buffing can be substituted for polishing, and results have proved that buffing on steel will conserve scarce metals and increase rust resistance.

TABLE II
Value of Plating on Polished Steel vs. Plating on Buffed Steel

Set Number	Polishing, Buffing, and Plating	Time in Salt Spray, Hr., and Condition of Metal								
		24	48	72	96	120	144	168	192	240
Series A,	plated with 0.0003 in. bright nickel									
1	Polished on 220 grain	P	P	VNR						
1	Polished on 220 grain and buffed	P	P	SR						
2	Polished on 180 grain	P	VSR	VNR						
2	Polished on 180 grain and buffed	P	VSR	SR						
3	Polished on 150 grain	P	SR	VNR						
3	Polished on 150 grain and buffed	P	VSR	SR						
Series B,	plated with 0.0004 in. copper and 0.0002 in. in bright nickel									
1	Polished on 220 grain					P	VSR	SR	SR	VNR
1	Polished on 220 grain and buffed					P	P	VSR	VSR	NR
2	Polished on 180 grain					P	VSR	SR	SR	VNR
2	Polished on 180 grain and buffed					P	P	VSR	SR	SR
3	Polished on 150 grain					P	SR	VNR		
3	Polished on 150 grain and buffed					P	VSR	SR	SR	VNR
Series C,	plated with 0.0008 in. copper and 0.0002 in. bright nickel									
1	Polished on 220 grain					P	P	VSR	SR	SR
1	Polished on 220 grain and buffed					P	P	P	VSR	VSR
2	Polished on 180 grain					P	P	VSR	VSR	SR
2	Polished on 180 grain and buffed					P	P	P	VSR	VSR
3	Polished on 150 grain					P	P	VSR	VSR	SR
3	Polished on 150 grain and buffed					P	P	P	VSR	VSR



AS the casting molds are pushed to the end of the conveyor line, they are placed on the special section shown above. The fork truck picks up the section and molds and transfers them to the shakeout machines.



THE flasks are rolled off the portable conveyor section into the shakeout machine where the sand is separated from the castings.



A SHOVEL attachment placed on the fork truck is used to gather up the sand spilled around the foundry, and a tilting mechanism on the shovel permits dumping the sand in bins or piles. This attachment is also used to gather up loose castings, and places them in bins or boxes.

Brass Foundry Material Handling

By J. M. MONROE

*Transportation Department, General
Electric Co., Schenectady*

THE use of a fork truck with a shovel and a conveyor section attachment, and the rearrangement of a conveyor line have permitted better material handling methods at reduced costs in the brass foundry of General Electric Co., Schenectady. The fork truck was obtained for handling molds, the molds being carried in units of eight from the conveyor to the shakeout by the one-ton truck.

Formerly, castings were knocked from the molds by hand onto the floor, and when cooled, the sand was separated from the castings and either swept or shoveled into piles around the molders' benches for re-use.

With the new method, the flasks are placed on a roller conveyor which carries them onto special portable sections at the end of the conveyor line. These special sections, containing the eight molds, are picked up by the fork truck and carried to the shakeout machine where the molds are unloaded and the sand shaken off. The castings are then stacked on pallets by the operator.

A shovel attachment fitted to the truck is used to scoop up the sand spillage and dump it into storage bins or on piles. This attachment also is used to shovel up loose castings and place them in bins or boxes.

New Equipment...

Welding Apparatus

This week's section describes two new automatic shell disk welders and outlines several new or improved resistance welders, together with controls and accessories for resistance and arc type units.

AN ingenious installation for welding together the ends of strips has recently been developed by *Progressive Welder Co.* It consists of two air-operated series connected spot welding guns, a notched bar to locate welds, and a control handle to move the gun along. The operator moves the gun to the first notch, which trips a switch to make the weld. Pulling the gun along makes a weld at each notch. The entire assembly is supported from an I-beam section above which is located the welding transformer.

Automatic Shell Welder

An automatic resistance welder, essentially a motor driven welding press, has recently been added to the *Thomson-Gibb* line. It applies sealing disks to the bases of small caliber shells at a high rate of speed. Powered by a 75-kva. transformer and equipped with a ten-station automatic dial feed, the

unit applies a projection weld around the entire outer edge of the disk. Except for hand loading, the operation, which includes ejection of the welded shell, is automatic and continuous. The machine is adjustable for wear, has a gage and regulator for control of welding pressure, and three cooling circuits.

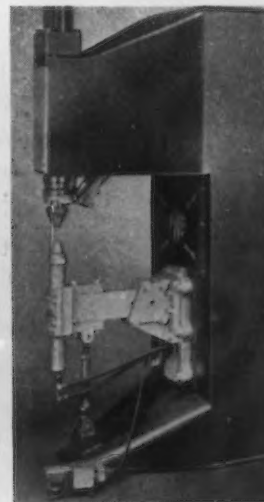
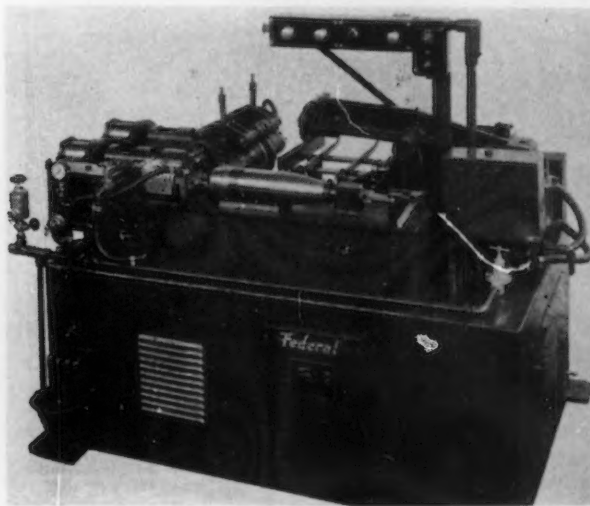
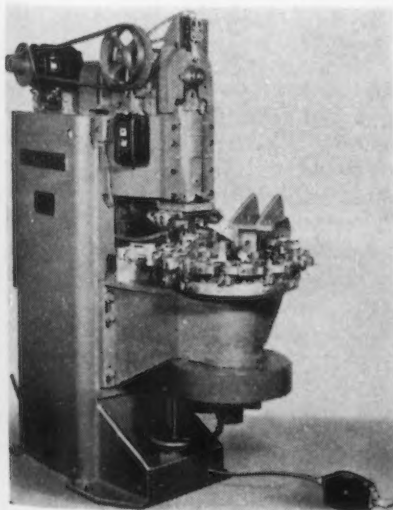
Horizontal Shell Welder

THE *Federal Machine & Welder Co.*, Warren, Ohio, introduced a line of horizontal seam welders to apply sealing disks to shells of medium caliber. The purpose of applying these disks to the closed end of shells is to prevent faults or porosity in the shell steel from causing a premature explosion in the gun. The Federal machines embody a special spot welding unit for

tack welding the disk preparatory to advancing the forging to the seam welding unit. Cradler rolls driven by a variable speed drive motor rotate the shell at the seam welding station. An air cylinder acts through an idler pressure roll to maintain pressure on the shell and insure rotation during the seam welding.

Forge Welder

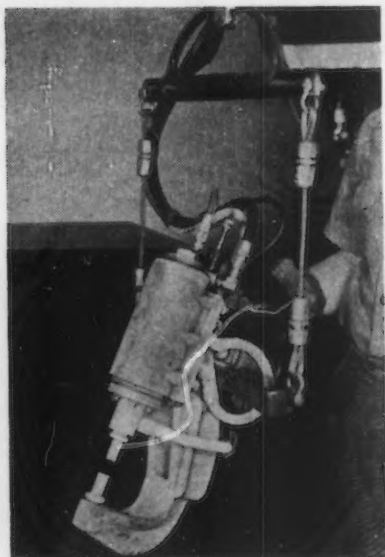
AMONG the improvements incorporated in the forge welder built by *Progressive Welder Co.*, Detroit, are a doubling of the available forging pressures and the use of an automatic current increase control. It is said that these changes, particularly the latter, now make it possible to obtain good welds on hot rolled sections without



the necessity of removing scale or rust prior to the welding operation. Forging pressures have been increased to a total available of 20,000 lb. per sq. in., provided by a hydraulic pump and controlled by a sequence timer.

Portable Welding Gun

FOR tack welding and assembly welding of sections in fixtures where the work cannot be taken to stationary pedestal welders, *Progressive Welder Co.*, Detroit, is



supplying a portable gun for particular use in the aircraft industry. The resistance welding gun, with its transformer, may be used in combination with virtually any control equipment used for welding aluminum. The air operated gun employs two differential cylinders, producing a maximum point pressure of 1200 lb., and accommodating two pieces of 0.040-in. thickness. Greater thicknesses may be tack welded.

Capacitor Weld Unit

DEVELOPED particularly for capacitor-discharge welding of aircraft aluminum, *Weltronic Corp.*, Detroit, announces the Revers-O-Charge, a new unit, said to assure high power factor with balanced 3-phase load and minimum peak kva. demand. It also embodies several new features designed to simplify control and improve operation. A voltage regulator controls the charge of the condensers to within plus or minus 2 per cent, and two 5-point tap switches permit quick



selection of the number of condensers to be charged. An 8-point switch selects the charging rate, and a variety of sequence panels is available. The condensers are charged in opposite directions for each weld, materially reducing line and rectifier loads. A number of new safety features are embodied in the unit.

Spot Weld Timer

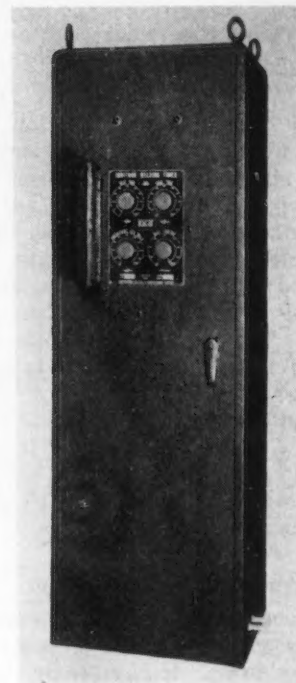
BECAUSE spot weld timing requires precise control, *Westinghouse* has developed a new controller using plug-in telephone relays for compactness, and thyatron tubes to actuate them. In order to establish the proper timing sequence for the job at hand the operator simply places plugs in the proper holes of the panel in the controller. The unit has an overall



weld timing sequence, subdivided into several "heat" and "cool" steps, each ranging from 3 to 30 cycles.

Ignitron Timer

ESPECIALLY adapted for seam and spot welding where frequent changes of timing are necessary, a new ignition welding timer is announced by *Westinghouse Electric & Mfg. Co.*, East Pittsburgh. Seam weld "on" or "off" timing adjustable from 1 to 30 cycles is provided; one to 15 pulsations can be made for each setting. In operat-

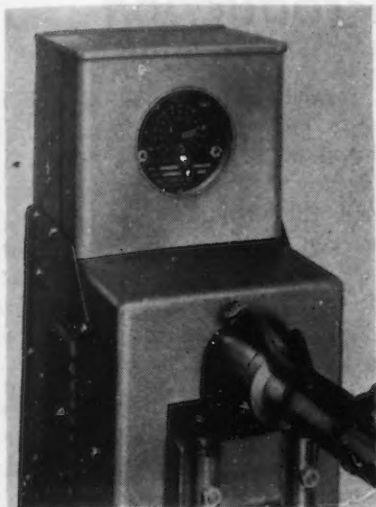


ing, the electronic tubes and circuits perform five distinct functions: (1) "On" timing; (2) "off" timing; (3) pulsation counting; (4) heat control, and (5) firing of the ignitron power tube.

Spot Welder

ACE spot welders, built by the *Pier Equipment Mfg. Co.*, of Benton Harbor, Mich., are now available with a new type unit for automatic control of welding time. By eliminating the possibility of human error, the improved welder is said to increase production and insure uniform welds. The adjustment range, calibrated in one-cycle steps, is from 3 to 47 cycles. Once the timing dial is set for a given job, depressing a foot pedal closes a contactor to energize the welding circuit and the timing element.

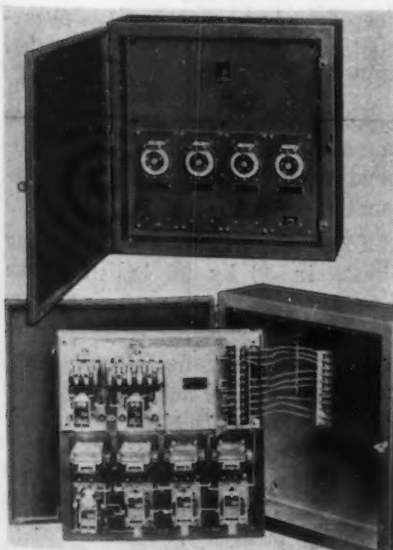
NEW EQUIPMENT



Maximum timing variation is said to be controlled to within plus or minus 1/120 of a second.

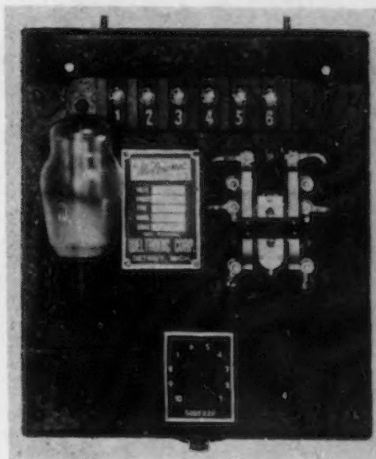
Pneumatic Timer

INCREASED safety, simplicity and flexibility are the advantages claimed for the 18 new models of Safront resistance welder controls manufactured by the *Square D Co.*, Milwaukee. All electrically energized parts are placed behind a protective panel to eliminate danger of shock when timing adjustments are being made. Calibrated timer adjustments are completely accessible on the panel front. Safront interiors swing out to expose operating parts, and the panel may be removed without disturbing external connections. A separate pneumatic timing device is provided for each step of the welding cycle. Timing periods range from 3 to 100 cycles.



Squeeze-Time Control

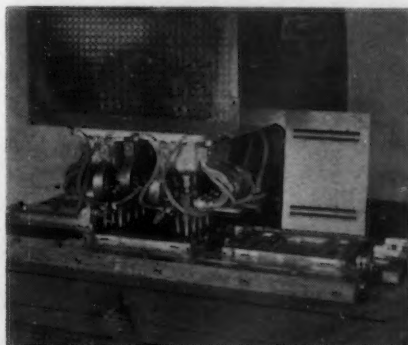
ASQUEEZE-TIME controller, designed to be used in place of pressure switches on resistance welders, is available also as an integral part of the sequence timers manufactured by *Weltronic Corp.*, Detroit. The unit is positive in action, operating on a fixed time-



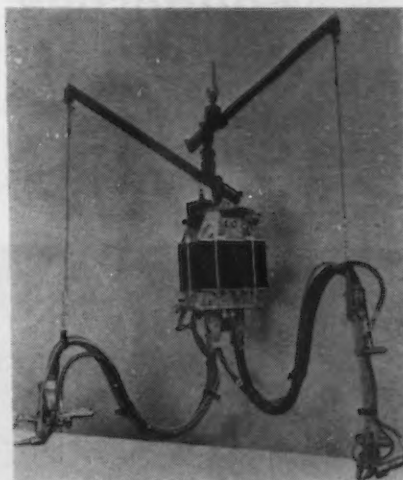
delay basis. It is said to eliminate all possible variables in timing, with the exception of the period required for the points to be brought together on the work.

Welding Assembly Fixture

WELDING of reinforcements in ammunition boxes has been speeded up on this welder which incorporates an unusual fixture shuttling mechanism developed by *Progressive Welder Co.* At the



right of the fixture may be seen the assembled part, the job being to weld the channels to the flat plate. With the fixture at the right the channels and box end are dropped in place and clamped. The fixture shuttles to the left below the welding point, where 16 welds are performed automatically. While this is taking place, a completed box is removed from the right side and parts for another clamped in place.



Adjustable Hanger

TWO compound springless balanced hangers have been developed by *Progressive Welder Co.* to support welding guns and transformers. The heavy duty type is designed for transformers rated up to 150 kva., and the lighter unit handles guns and transformers to 75 kva., permitting individual counterbalancing of two separate units, such as riveters, welding guns and other forms of heavy hand type tools.

Cleaning Brush

TO facilitate the cleaning of slag, scale or oxidation from welds on inside corners a new power driven end brush is available. Manufactured by the *Osborn Mfg. Co.*, Hamilton Avenue, Cleveland, it will get into any space accessible for welding. It can be used in all standard power tools, air or electric, and measures 1/2 in. in diameter across the end, or brushing surface.



Follansbee Starts Clad Steel Production

FOLLOWING recently completed installation of special production facilities, Follansbee Steel Corp. is now manufacturing

copper and cupra-nickel clad steel by a process which is in extensive use in several European countries. Under the practice of Follansbee,

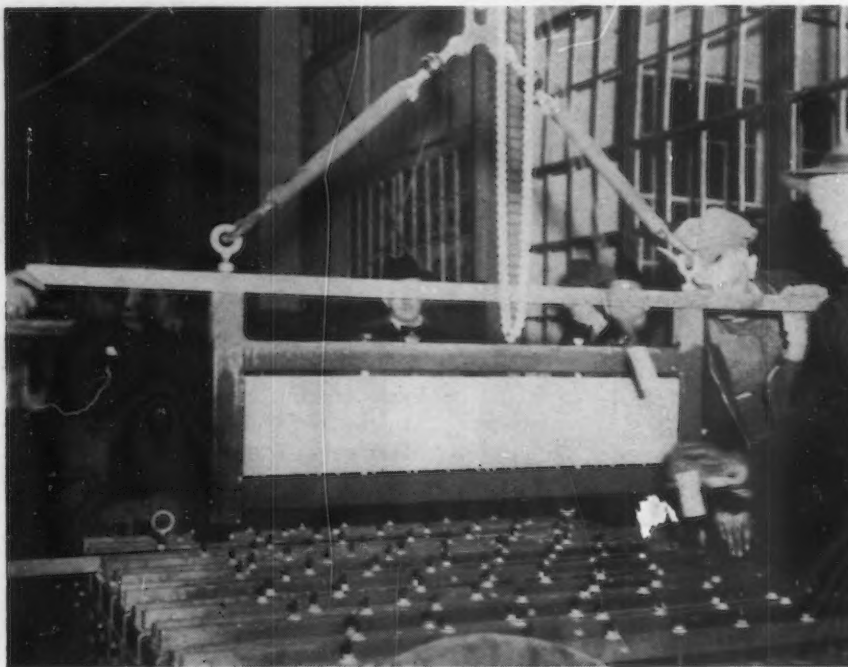
a forged and rolled steel slab is first coated electrolytically as shown in Fig. 1, after which the cladding sheet is applied. The slab with the cladding sheet, is then charged into a special electric furnace chamber, Fig. 2, of the ball type, using an atmospheric gas which is inert to the material to be treated.

The charge is then subjected simultaneously to high pressure and the application of accurately controlled and scheduled electric heat. The entire charge is homogeneously fused into units—commonly known as platines—of a steel base and cladding surfaces, each of which is separated by thin layers of dissimilar material. From these platines are produced the finished sheets by hot rolling, cold rolling and finishing.

The clad sheet is even and smooth, with the clad surface ranging from 5 to 20 per cent, thus increasing the availability of strategic non-ferrous metals by as much as 80 to 95 per cent. The thickness of the cladding is governed by the service requirements of the fabricator. Exhaustive tests made of the clad material indicates that it possesses a ductility superior to that of the base material, withstanding any stress up to the breaking point of the base to which it is clad. This characteristic is said to make the material well suited for deep drawing operations, as in producing bullet jackets, electrical housings, utensils and containers.

The cladding may be applied to one or both sides of the sheets, depending upon the service requirements.

Follansbee is currently producing sheets in 36 by 96 in. maximum sizes and in gages ranging from 7 to 28, inclusive. A variety of obvious applications include bullet jackets, electrical housings, utensils and containers. In addition to cladding with copper and copper alloys, the company plans to produce steel clad with brass, gilding metal and stainless steel.



ABOVE

FIG. 1—The first step, above, in producing Follansbee clad steel, applying an electrolytic coating to prepare the slab surface for cladding.

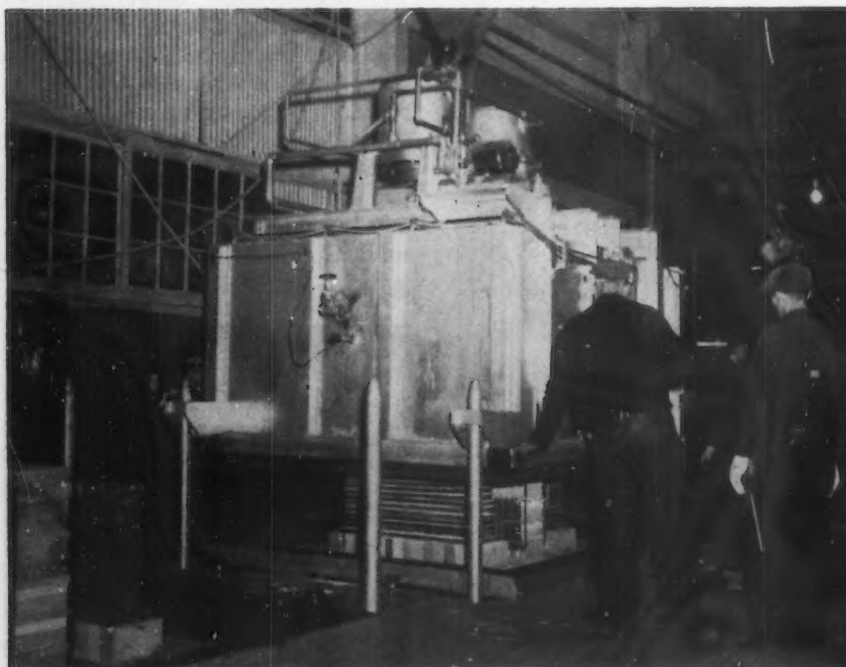


FIG. 2—After the cladding sheet is applied to the electrolytically coated slab, the material is charged into this electric furnace where high pressure and heat is applied.

Westinghouse Holds Seventh Machine Tool Forum

BECAUSE of the press of war production, sessions ordinarily covering three days were squeezed into two at the seventh Machine Tool Electrification Forum, held on April 6 and 7 at the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. Electrical and mechanical engineers of the leading machine tool builders and of some of the larger users of machine tools took part in the discussions, which were featured this year by a number of informal round table conferences. R. S. Palmer of the machine electrification section of Westinghouse presided as chairman.

Subcontracting Problems Reviewed

At the closing dinner on Tuesday night, some of the problems involved in subcontracting were reviewed by Frederick B. Heitkamp, vice-president, American Type Founders, Inc. Locating adequate sources of manufacture, he said, involves the weeding out of a great many manufacturers who may want to do the job but who really are not set up to do it. When the subcontractor has been selected, even then it is necessary to help him on his production methods—even supply him with machine tools—and help him in the design and manufacture of jigs, gages and fixtures. In many plants, Mr. Heitkamp's company has placed resident engineers who expedite production and supervise inspection.

Subcontracting multiplies the normal type of manufacturing problems many times, the speaker said. Having to deal with manufacturing problems under forty or more different roofs is one aspect. Subcontractors have to be supplied with materials and local sources of supply of castings, forgings and bar stock located for them. Proper contacts with the Ordnance Department and with Washington to set up means of inspection supervision by district ordnance offices have to be established in these subcontracting plants. Designs of war products are being constantly changed in the light of actual combat experience and this further adds to the complication of manufacture.

Earnest people who are working on these programs are thoroughly fatigued, and the question of personnel relationships and ability to

get these things done enters into the problem as a whole. Mr. Heitkamp pleaded with his audience to lend as much technical assistance as possible to customers of the machine tool industry who are getting into war work. Although production is rapidly gaining momentum, hour by hour, much planning and scheduling and organization remains to be done before



TELL BERNA (left), general manager, National Machine Tool Builders Association, seen talking with Charles B. Stainback, manager of industrial sales, Westinghouse, at the Westinghouse Machine Tool Electrification Forum.



FRED B. HEITKAMP, vice-president, American Type Founders, Inc. (center), was the principal speaker at the closing banquet. He is shown talking with L. F. A. Mitchell, manager of machine electrification and aviation section of Westinghouse (left), and Bernard Lester, special representative of Westinghouse.

many of the new jobs are put on the machines, he concluded.

Adjustable Speed Drives

One of the subjects that has frequently been a topic on previous Westinghouse forums has been variable speed drives for machine tools. At this session, G. A. Caldwell, industry engineering department of Westinghouse, reviewed all the possible choices of d.c. adjustable speed drives from a.c. motor generator sets. From the point of view of simplicity and lowest first cost, he recommended a new form of series variable voltage control where the desired speed range did not exceed 10 to 1. As shown in the schematic wiring diagram, Fig. 1, the only control equipment required consists of a linestarter with a start and stop pushbutton for the M-G set and a speed adjusting rheostat shunting the series field of the d.c. generator. Unlike the conventional Ward-Leonard system, the exciter is eliminated by using a series wound d.c. motor and generator instead of shunt wound equipment.

Ordinarily the characteristics of a d.c. motor are unsuited for machine tool application because of its tendency to run away at no load. However, when a series generator is used to supply power to a series motor, the low voltage of the generator at light loads holds down the inherent high, no-load speed of the series motor, and the high voltage of the generator at heavy loads increases the speed of the motor at these loads. The net result is good speed regulation under varying loads, particularly since there is sufficient friction load in the machines so that actual increase in speed at no load is never obtained. On the other hand, the drive still retains the inherent high starting torque of a series motor, being at least six times full-load torque when the rheostat is set for 1/10th of maximum speed. A very soft start is given because the series generator builds up gradually as the driving a.c. motor accelerates when the line switch is thrown. Stopping is accomplished by stopping the M-G set, allowing the drive to drift to a stop, although it is possible to adapt dynamic braking by a reversal of the series motor field through auxiliary control apparatus. The motor is disconnected from the generator and the series field reversed and connected

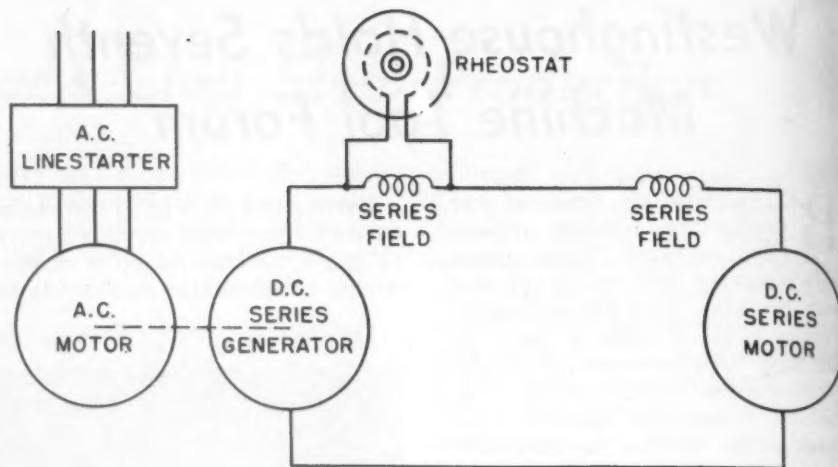


FIG. 1—Schematic diagram of series variable speed drive, using self-excited fields for d.c. generator and motor.

across the motor armature with a resistor in series.

The original series variable voltage drive was developed in cooperation with the Landis Tool Co. as a simplified drive for the headstock of its grinders, largely using motors of fractional horsepower size. Since then a complete line of units has been developed by Westinghouse up to 15 hp. and has been applied to a wide variety of drives. The rheostat is the chief limiting factor in size of equipment that can economically be built.

Combination Control

A second form of simplified variable voltage drive described by Mr. Caldwell is shown in Fig. 2. In this scheme a shunt wound d.c. motor and a shunt wound generator are used, both units so connected that they are excited from the generator, which departs from conventional design in that it must be stable at a materially reduced voltage ($\frac{1}{4}$ normal) when operating self-exciting. The speed control of this drive is obtained by means of a rheostat that has two plates mechanically connected, with one plate in the generator field circuit and the other in the motor field circuit. In the low speed position, the motor is at full field and the generator at weak field. Then as resistance is cut out of the generator field to raise the generator voltage, the resistance in series with the motor field is increased at a rate to maintain full field motor current. The generator reaches full voltage

at 180 deg. rotation of the rheostat and further rotation weakens the motor field to obtain higher speeds without affecting the generator voltage.

Since part of the speed range of this drive is obtained by shunt field control of the motor, it is constant horsepower over that portion of the range and constant torque over the portion of the range obtained by voltage control. It is therefore particularly suited to those loads requiring high continuous running torques at low speeds and light continuous running torques at high speeds. Dynamic braking can be obtained in the conventional manner by disconnecting the d.c. motor and placing a resistor across the armature. This simplified form of adjustable voltage drive was developed in cooperation with G. A. Spohn of the General Machinery Co.

Mr. Caldwell also described several other types of adjustable speed drives, too complicated to cover in this space, one using the conventional system, but with a Rectox rectifier unit substituted for the exciting generator. Discussing equipment using d.c. motors supplied from an electronic rectifier, the speaker stated that at the present time the equipment is rather limited in size and also is more expensive than the variable voltage control using an M-G set. The normal unit uses two electronic tubes to give single phase, full wave rectification. There is a set of smaller rectifier tubes to give d.c. power for the

field circuit. The pulsating d.c. voltage obtained results in a higher r.m.s. value and hence a larger motor frame size for the same duty, if motor overheating is to be avoided. The speed range is obtained by means of grid control which makes the d.c. current even more pulsating at low speed, thus greatly increasing motor losses and motor heating. Nevertheless, comment from the audience indicated that an electronic solution of the variable speed drive is much to be desired by the machine tool industry.

Controls for Packaging Machines

Some of the problems involved in the design of electrical control equipment for an automatic milk carton filler were described by V. T. Grover of the American Can Co. Frequently both the driving motor and the control apparatus is placed under the machine proper where it is subject not only to milk drip but to being washed down with a hose at frequent intervals. Mr. Grover illustrated a totally enclosed, streamlined motor which has recently been developed for this service by Westinghouse. The conduit box is part of the hinged base. Pushbutton stations must be watertight. American Can practice is to use a series of three piston rings about 1 in. in diameter, without a lubricant. Door panels are sealed with Permatex. Control circuits are at 110 volts, as in machine tool practice, but the current is carried with No. 18 Flamenoil wire carried in copper tubing as a conduit. The machine tool standard is No. 14 wire.

Illustrated in Fig. 3 is a typical

wiring diagram for a milk filling machine, bringing out certain design principles used by American Can Co., namely:

- (1) Provision for a disconnect means, preferably a circuit breaker.
- (2) Use of magnetic starters with three-wire control, except in isolated cases.
- (3) Use of bimetallic overload relays, which are shunted for jogging.
- (4) Automatic stops operated from low voltage which is obtained from a transformer.
- (5) If there are two or more automatic stops, indicator lights are used which are lighted only when automatic stoppage occurs.
- (6) All automatic stops are wired to prevent starting the machine if one or more stops are open.

A bimetallic overload relay, of the Spencer disk type, is preferred over the solder pot type because in the latter case if an attempt is made to reset the relay before the solder is sufficiently hard, a reaming action occurs that quickly destroys the thin coat of solder.

On some of these machines considerable jogging is required when setting up. Some of this jogging is of the telegraphic type, that is, the machine is moved in short steps by rapidly striking the jog button. Such jogging will overheat the overload relays in a few minutes and stops the motors although they themselves may not have been overheated appreciably. To save time in waiting for the overload relays to cool off, provision is made to shunt the motor overload relays during the jogging period by means of a jog-run se-

lector switch, shown in the diagram.

Another application of motors where excessive moisture is encountered is in laundry equipment, the electrification of which was described by William P. Beattie of the American Laundry Machine Co. Totally enclosed motors are useless, he said, unless a hole is provided in the base through which the water can be drained. Actually, open frame motors are generally employed and little trouble from water is encountered since they ordinarily run quite hot (+ 34 to 36 deg. C.) and tend to dry themselves out. The motors are put up on top of the machines, to avoid direct drip from wash. Controls are mounted on JM Ebonite panels, which appear to be immune from shorts due to condensate on the polished asbestos-base board.

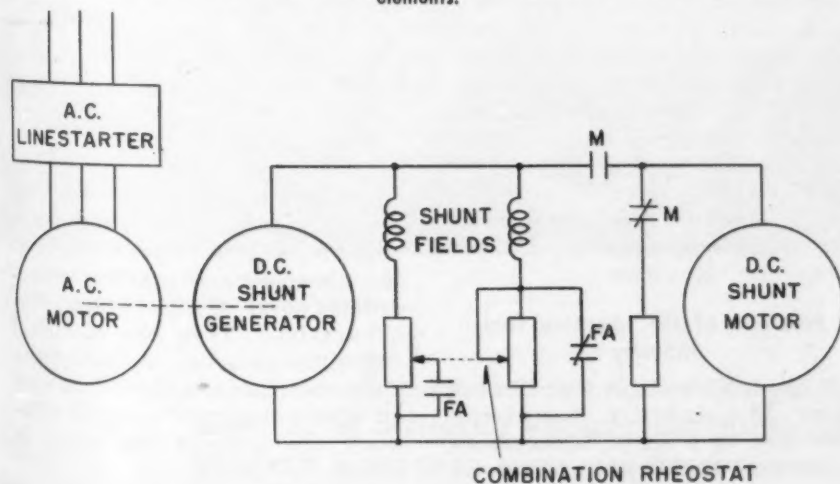
Mr. Beattie showed numerous photographs of recent large installations of laundry machinery in army cantonments throughout the country and also photographs of mobile laundry units mounted on trailer trucks. This field unit will handle the wash of a company a day. Many of these machines were constructed of stainless steel and monel metal, but Mr. Beattie indicated that in the future, commercial units would have to be made largely of wood because of material restrictions.

An explanation of the electrical drive units and controls on a thread grinder was given by Lee M. Davis of the Jones & Lamson Machine Co. Dynamic balance and shaft runout are carefully checked on both the wheel motor and the work drive motor. Ball bearing motors are used throughout.

Motor Balance Neglected

Later in the program a round table discussion on balancing of motors was led by E. M. Taylor, chief engineer, Heald Machine Co. Standard practice on balancing motors has been overlooked by NEMA, and it will be up to the machine tool builders to write their own ticket on this specification. Many machinery builders specify unbalance limits but few of them have equipment with which to test motor unbalance. The motors should be checked by the buyer, it was agreed. The discussion led to a consideration of other motor defects, including inaccuracies in the manufacture of

FIG. 2—Schematic diagram of self-excited adjustable voltage, variable speed drive with combination rheostat and dynamic braking. The rectangular boxes represent resistance elements.



flange mounted motors, limitations on end play in bearings, and motor feet not being all in one plane. It was pointed out by Westinghouse engineers that all these added refinements can be obtained if the customer is willing to pay for them. The most serious inaccuracy, as far as machine tool builders are concerned, is the fact that flange mountings may be eccentric with the motor shaft by as much as 0.010 in., resulting in poor meshing of gears when such are used on the shaft extension. This condition applies to many makes of motors.

Metal Cutting Forces

Data on the forces developed in cutting metals and the power required to drive various types of machine tools were presented by

tool is the following:

Tangential load, lb....	1110
Longitudinal load, lb...	123
Radial load, lb.....	450

Cutting SAE 3135 steel dry at 50 ft. per min. with 0.150 in. depth of cut and 0.030 in. feed per rev.

The tool was high speed steel with 8 deg. back rake angle, 22 deg. side rake angle, 6 deg. side and end clearance and a 15 deg. side cutting-edge angle. The loads vary with the speed, feed, depth of cut and tool angles. Use of any type of coolant from soluble oil to sulphurized compound has little effect upon the cutting forces and hence on the power requirements, but does materially affect the tool life.

Lathe efficiencies from the point of view of power transmission are much lower than most engineers think, Professor Boston stated.

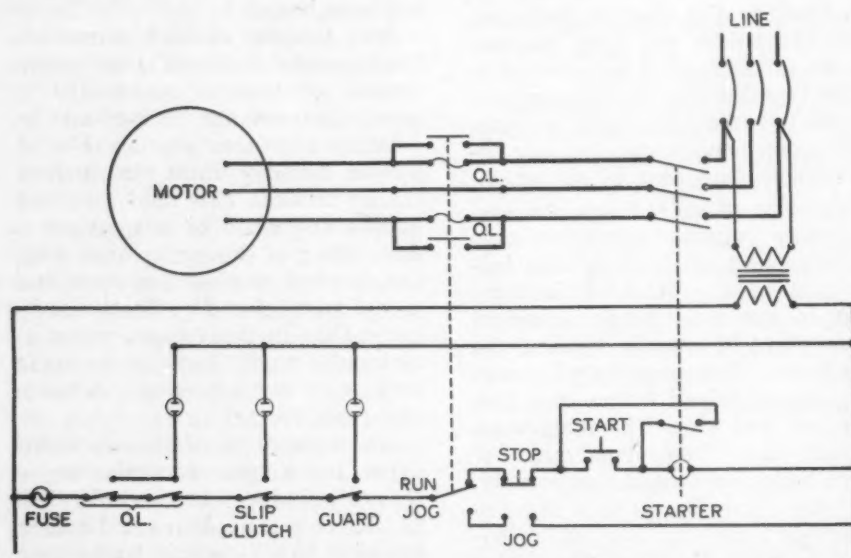


FIG. 3—Typical wiring diagram for an automatic milk filler drive as developed by American Can Co. Micro switches on the overload relays (O.L.), slip clutch and machine guard actuate the signal lights shown above these units when any of them open.

Prof. O. W. Boston, head of the department of metal processing, University of Michigan. Test data accumulated over a period of years showed that it takes approximately 1 hp. per cu. in. of steel removed per min., regardless of the type of cutting tool material. Power to cut cast iron is about half that needed to cut steel. In lathe work, between 96 and 98 per cent goes into the tangential cutting force and the rest into the longitudinal feed.

Professor Boston explained how special dynamometers have been constructed capable of measuring the tool forces in three directions—tangential, longitudinal and radial. Typical of the loads on a

Depending upon the spindle speed, the efficiency may vary from 25 to 50 per cent, which means that if 2 hp. is required at the tool, from 4 to 8 hp. must be supplied by the driving motor. Most of the power goes into running the machine idle. In drilling, on the other hand, machine efficiencies run as high as 80 per cent. Most of the power goes into turning the drill, less than 0.5 per cent of the power going into the thrust.

Problems of the Machine Tool Industry

Although admitting that the machine tool industry was being burdened by a lot of unnecessary paper work in filling out forms and

answering endless questionnaires sent out by various government agencies, Tell Berna, general manager of the National Machine Tool Builders Association, asked his audience not to be too critical of nor too impatient with the men sending out these questionnaires. Fortunately for the industry, there is a high caliber of machine tool men in Washington engaged in furthering the war effort. He regretted the criticism directed against \$1 a year men, who he said "are doing a swell job for the war program."

The machine tool industry, Mr. Berna said, has been faced with many problems in the past year, among them the difficulty of training men, the increasing difficulty of getting good training material, and the difficulty of upgrading men into supervisory jobs. The biggest job lies immediately ahead, however. The next few months will be the critical ones, and Mr. Berna wondered if Washington appreciates what is being accomplished in the various machine tool plants.

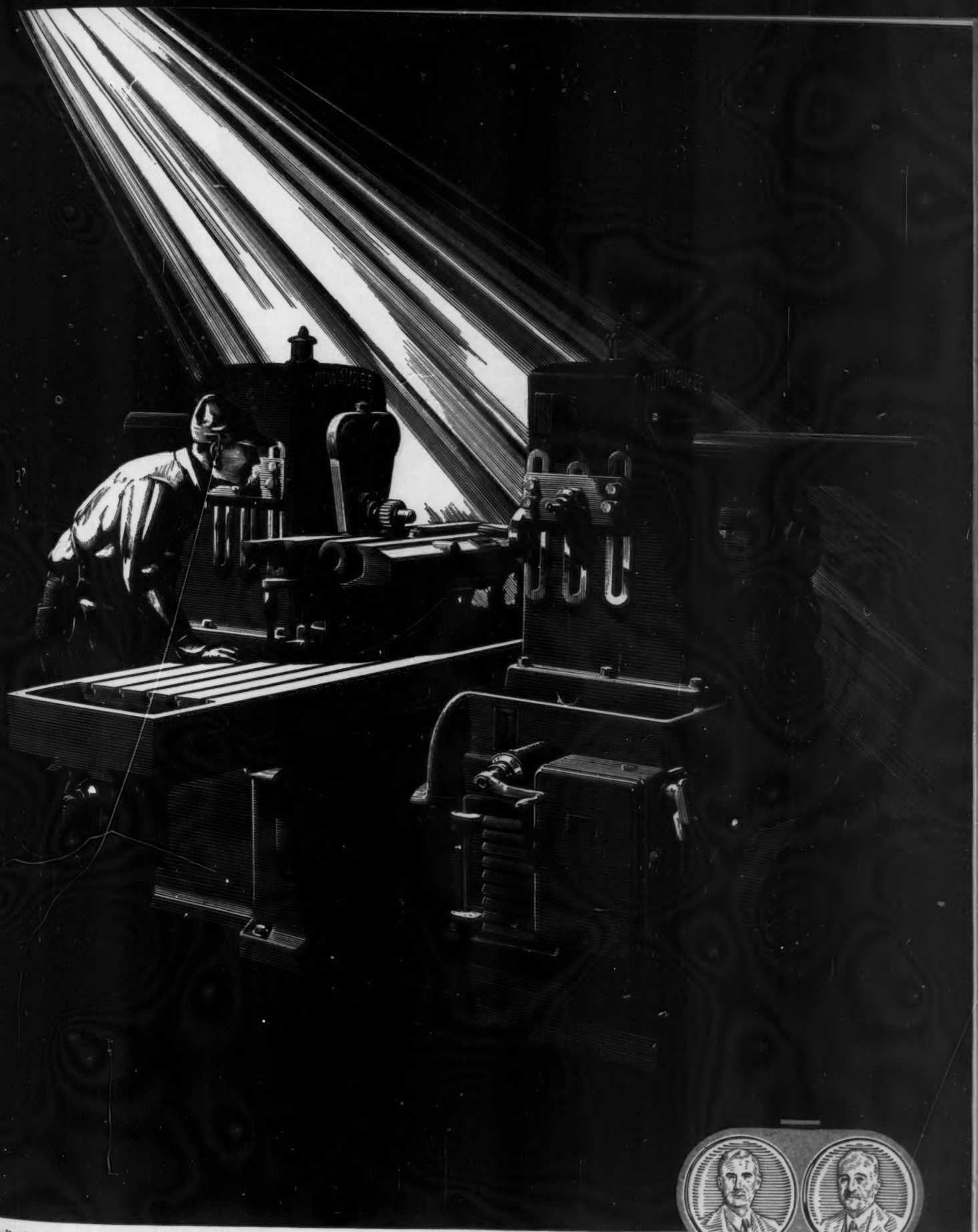
One of the most effective jobs done in the past year has been the work of the electrical committee of the association which has prepared tentative machine tool electrical specifications. Although at first members of the National Electrical Code gave the machine tool committee little serious attention at first, the technical subcommittee of the code authority has recently made the recommendation that Article 430 of the National Electrical Code be revised to bring it in line with the tentative machine tool electrical standard. Mr. Berna pleaded with machine tool builders to actually put the proposed standard into effect in wiring machine tools and asked some of the industry's big automotive customers to forego some of their prerogatives and cooperate in the program. The Chicago City Code and the California State Code still have to be reckoned with, however.

This tentative standard is the first of a number of steps toward fuller standardization of electrical devices on machine tools. The next step will be to get the mounting dimensions of starters standardized so as to make them interchangeable. Then the electrical committee proposes to standardize the nomenclature and symbols used on wiring diagrams so as to eliminate the present confusion in terms.

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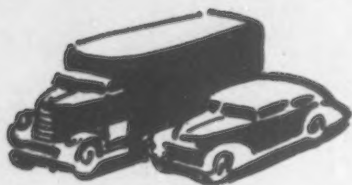
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Assembly Line . . .

• West Coast aircraft proposal by UAW on joint labor-management committees parallels Reuther plan . . . Auto body steel use predicted in airplanes . . . Natural rubber experiments needlessly delayed, scientist says.



DETROIT—On the West Coast, a UAW-CIO proposal for joint labor-management production committees and for pooling of skill, experience, talent and machinery (verily, the Reuther Plan and the Murray Plan again) now appears to be a hot issue.

According to the IRON AGE column "West Coast" in this publication a week ago, the UAW proposal for a communal pool is being pressed during the union's spring drive on the aircraft industry in southern California.

In Detroit the Reuther plan has been so thoroughly discredited technically that even its author, Walter Reuther, couldn't defend it very successfully in his debate with C. E. Wilson, president of General Motors. Wilson publicly labeled the plan as political in nature and simply a publicity gag. Now the union has revived it on the west coast, this time without projecting Reuther's personality into the picture.

As reported, eight major Pacific coast plane makers have replied to the UAW by announcing the organization of the Aircraft War Production Council, Inc., a coordinating organization which seemingly parallels the Automotive Council for War Production formed by the automobile industry in the final days of 1941.

Thus the whole union plan has been transposed across the continent, and the form of the manage-

ment reply also appears to have been transposed from Detroit; it is remarkable that even details of the west coast affair seem to fit the pattern developed here in recent months.

HARKING back to "The Assembly Line" of Jan. 29, we call attention of the aircraft industry to the words: "What they (other industries) see happening here may very soon establish a pattern and final form under which they, too, will carry on their war work . . . other industries can take a few tips. The best way to highlight the suggestions that arise from hindsight is to review briefly what has gone on in this industry."

The aircraft industry's top management executives might do well to review those Jan. 29 comments as well as those published after the Wilson-Reuther debate. In fact, transcripts of the debate are available from General Motors Corp. and they, too, are worth reading by aircraft executives who must decide how to combat the fallacious and vicious propaganda wave.

A particularly ugly and unfortunate aspect of the UAW's propaganda campaign is that its unbiased criticism of these industries (first automotive and then aircraft) create confusion and lack of confidence in the very industries upon which the nation depends for its ultimate salvation. This UAW campaign in the west is an adequate answer to those who wanted to know why Wilson chose to debate the Reuther plan even at this late date.

Particular grounds for criticism of the aircraft industry seem to center on the fact that some plants are working short hours and short work weeks. It does not appear from the record, however, that the aircraft plants are working short hours from choice. They are doing so because scheduled shipments (established by government agencies) are the limiting factor on the work week, or because of material shortages.

ONE of the major executives of the entire aircraft industry said here privately a few days ago that his plant is virtually all tooled for a capacity production of about \$35,000,000 worth of airplanes per

month. Production in his plant is accelerating according to schedule (a statement verified by Donald M. Nelson) and is now nearing an output of \$20,000,000 per month. However, because of the material situation this executive expects his plant's production to level out at approximately \$20,000,000 per month in May, with no rise expected in this production curve until after November. It appears that this very large airplane manufacturer represents a typical slice of the industry and that the nation's airplane production curve will follow a similar pattern.

A probable course of action for the UAW is to seize on this fact (the leveling off during the summer months) as a major point of criticism and lay the blame at the door of the aircraft industry. It will be a terribly weak position for the UAW to take, since it can be demonstrated that the leveling off is not the responsibility of the aircraft industry, but specific answers by the industry will be difficult because production figures and production capacity, etc., all are censorable these days.

IT is to be hoped that the aircraft industry's new council will provide it with a means of getting management executives together to lay the ghost of this pseudo-plan before the union's tom-tom beaters get in their licks. It has in the past been a weakness of the aircraft industry that its executives have not sat down around an industry conference table to pool their ideas on labor problems. In saying this we take full cognizance of the fact that the industry has pooled patents, that its design and production information is supplied to the Army and Navy departments and is, therefore, accessible, in a sense, to other manufacturers, and that there has been a rapid and frequent shifting of technical and production personnel from one plant to another during years of peace so that the interchange of technical information has been quite general. But management executives, as such, have steered clear of taking their hair down and doing any industry-wide planning of a type that would prove useful in replying to the UAW.



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Incidentally, technical difficulties that might be "over the heads" of union business agents sometimes are accountable for slow-ups in production. An example lies in the fact that aircraft fuels used in some of the far corners of the earth have been found to have serious effects on the rubber material used in leak-proof gasoline tanks. The rubber apparently is allergic to the petrol supplied for aviation engines in some of the oriental regions where the war is being fought, and no joint labor-management production committee could

and bombers which have been most emphasized until recently, is beginning to be reflected in activities in the woodworking industry. Various groups of furniture manufacturers have already banded together and have received orders to do sub-contracting work on these aircraft and on the combination steel-plywood North American training planes which recently have been announced.

The use of low carbon, low alloy steels—as in the case of the North American trainers—is definitely known to be only a stepping-stone

great stiffness and low weight have resulted. A further extension of this idea makes use of perforated metal for the auxiliary sheet.

RECENTLY the plant Tau-sagyz, a possible source of natural rubber, and Kok-sagyz were mentioned in this column, along with the observation that difficulties in obtaining samples of the plants from Russia had possibly interfered with American experimental work on these sources of rubber. Since that time there has come to our attention a report by the leading exponent of the use of Kok-sagyz, and the leading research expert on this subject in the United States. He is Dr. Paul J. Kolachov, director of research and development for Joseph E. Seagram & Sons, Inc. In a report to the National Farm Chemurgic Council, he states:

"The reaction of the government agricultural research workers to the bulletin recently issued by the National Farm Chemurgic Council on Kok-sagyz has demonstrated a regrettable inertia in that group. Kok-sagyz has not yet received fair consideration. This is primarily because information possessed in this country is old, in fact, it is obsolete. Our information is based on Russian reports as recent as March, 1941, and from the official record of the Soviet government, where the statement is made that by mechanized operation the former yields have been tripled. . . . It is true that repeated efforts to obtain seeds from Russia some years ago failed when our relations with that country were not as favorable as they are today. Does this not indicate, however, that the Russians 'have something there'? Since relations between the United States and Russia have so much improved, we strongly insist on renewing our efforts to obtain Kok-sagyz seed for experimentation in this country.

. . . We should like to make a very strong statement to the effect that the information which Washington possesses on Kok-sagyz is of the same degree of accuracy as the information the world had about the Red Army . . . This rubber conference (at Webber College, Babson Park, Fla.) should bring pressure to bear in Washington to procure the seed for experimentation.

Dr. Kolachov supports the idea that Kok-sagyz is more adaptable than Tau-sagyz because it is more resistant to diseases and climate.



British-Combine Photo

ROCKET SHIPS: First test flights of the screwless Italian Caproni-Campini "C.C.1" jet propulsion airplane were made in August, 1940, at Taleido Aerodrome. This, the improved "C.C.2," is a two-seater, 11,000 lb. ship, is now undergoing trial flights. For propulsion, air enters a nose duct, is expanded and passes into a compressor which may be a normal airplane motor or an internal combustion turbine. The air is then ejected through a smaller duct with a controlled outlet behind the tail. The hot exhaust gases of the motor which drives the compressor are ejected in the same duct and aid the propulsion which comes from the kinetic energy in the jet.

cure that. It has been necessary for technicians to tackle the problem and, meanwhile, there has been some delay in shipments. This does not mean there has been any production loss—the output of wings and planes has proceeded and it is regarded as a small matter to catch up.

AN authority in the aircraft industry predicts that the only new designs that will appear in the European war this spring will be large transport planes and freighters. There is evidence that United States, too, is beginning to place more emphasis on this type of aircraft and on cargo-hauling or troop-carrying gliders. Information has been very much restricted, but several contracts for gliders, amounting to approximately about \$1,500,000 in each instance, have been publicly announced. Gliders ranging from two-seaters to 24-seaters are known to be on order.

This emphasis on auxiliary types of aircraft, in addition to fighters

in the direction of steel planes which will make use of the equivalent of auto body sheet steel. Details are about to be released on methods for using cold-reduced commercial black plate for both structural and non-structural parts of aircraft. As a matter of a substitute for immediate use, this is extremely important, but it is impossible to avoid thinking of the potential use of auto body sheet or its equivalent in the private or commercial passenger and freight planes of the future.

Very largely the problem of using such material has hinged on the possibility of attaining a strength-weight ratio equivalent to that of aluminum alloy sheets. This has been accomplished through the efforts of a Detroit aircraft research group which made use of cold-reduced low carbon steel, combining expanded metal with sheets in a normal condition. The expanded metal has been corrugated and otherwise shaped so that, when spot welded to the surface sheet,

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Metallurgical Department are available to help you get to the bottom of tool troubles anywhere along the line.

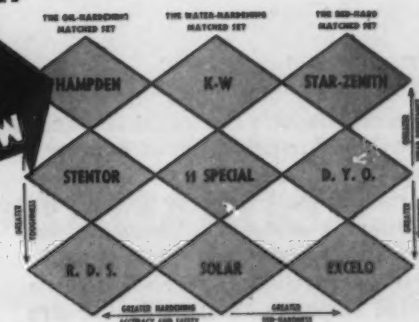
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Washington . . .

• Production Requirements Plan would hit non-integrated steel mills . . . Insistence on priority compliance will prevent rolling of materials for such units . . . Transfer of sheet tonnage from integrated plants suggested.



WASHINGTON — Whatever may be the merits of WPB's Production Requirements Plan, its strict application would be highly injurious to non-integrated steel mills, causing widespread idleness among them. That this will be permitted is inconceivable in this hour of vital and immediate necessity for every pound of war steel that can be produced. It is incongruous in view of WPB action practically halting consumers' durable goods using critical metals. PRP, consequently, must be revised so that it does not do incalculable harm to the industry.

The reason that non-integrated mills under the PRP plan would be threatened with shutdowns is that they would be unable to get sufficient quantities, if any at all, of semi-finished steel, their raw product. This seems clear upon a brief analysis.

IRON and steel and other materials will be put under PRP after June 30. Basically, this plan provides for allocation of quarterly quotas of materials. These materials are obtained by ratings individually assigned. These ratings are made an average according to the proportion of high and low rated shipments and unfilled orders

during the most recent three months.

Iron and Steel Branch Chief C. E. Adams on March 9 issued a warning that war orders for steel must be produced in proper priority sequence, regardless of the product involved. Mr. Adams went on to say "that it is necessary to apply the preference rating system beginning with the ingot production of each producer and see that it is followed strictly in all subsequent operations in the absence of contrary instructions from the Director of Industry Operations."

THUS, as Mr. Adams pointed out, finishing mills carrying high preference ratings must be provided with steel to insure maximum operations regardless of the fact "that you may not then be able to assign steel for the production of lower rated products."

As it happens, about 90 per cent of the steel allocated by directives has gone to the integrated mills. They have been permitted to use their own products and for this reason have received the greatest percentage of high rated orders.

Non-integrated mills, according to reliable WPB sources, also benefited by allocations, but had a small percentage of high rated orders with the majority falling below A-4, and a large per cent being taken up with unrated orders.

WHEN it comes time for non-integrated mills to receive preference ratings under PRP, obviously the rating which they will receive will be inadequate to get high rated materials such as billets, sheet bars, etc., unless the pattern for assignment of ratings is changed to enable them to get the high rated steels.

The effect of the Adams insistence on priority compliance will prevent the rolling of materials needed by the non-integrated mills because of inadequate ratings which they may receive, and the fact that the integrated mills will in all likelihood get the majority of allocations, as previously, unless some change in procedure is effected.

Non-integrated mills may be told to go out and get more high rated defense orders, but as has been pointed out this will be impossible,



199 PRIORITIES FOR \$41 WORTH OF ELECTRODES: A dramatic illustration of the need for simplifying priorities procedure was the recent experience of Lincoln Electric Co. which was required to fill out 597 separate priority forms to enable it to fill an order for 700 lb. of electrodes worth \$40.90. Lincoln estimates that more man hours were required to complete the 597 priority forms than was required to produce the electrodes. The photograph shows W. A. Dewald of Lincoln's order department and J. F. Lincoln, president of the company, with the batch of 199 priorities, each consisting of three sheets, and weighing a total of 5¼ lb. The actual itemizing of the order required less than a page.

with the result that there may be much idle capacity in mills producing plates, cold drawn concrete reinforcing bars, and small structural shapes, etc.

HERETOFORE, non-integrated mills got directives allocating semi-finished steel, permitting them to operate at the same rate, but PRP's present method of forming

CASE "A"

Reduction of 64% in
man hours in one single
operation

CASE "B"

Increase from 20 to 80
tons of steel handled in
one day

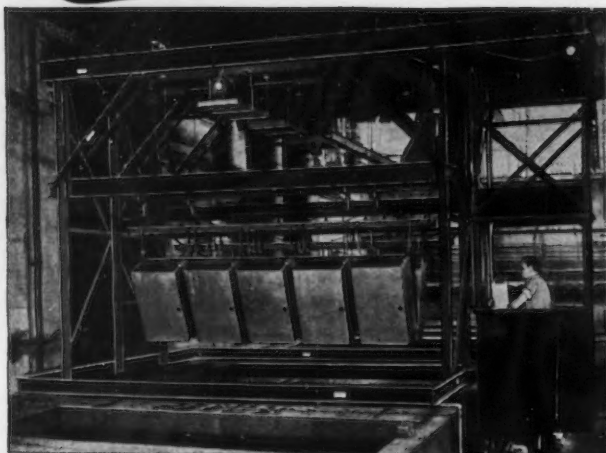
CASE "C"

Production increased
30%

HOW'S THIS FOR *Stepping Up* PRODUCTION?

YOU, too, can accelerate your rate of production as rapidly as you release man-power from handling labor. Any mechanical means of lifting and carrying even light loads reduces fatigue and thereby makes possible a greater output per man.

This is only one of many advantages gained with American MonoRail Handling Systems . . . to mention a few others — reduction in idle machine time, more compact arrangement of machinery and equipment, congested operating conditions overcome, and waste space converted into profitable space. **BUT STEP UP PRODUCTION YOU MUST.** Let an American MonoRail engineer show you how it can be done in your plant. American MonoRail equipment is engineered to meet the particular requirements of each problem. There is no delay or shut down during installation.



Special crane handles multiple units through cleaning process.



Overhead tracks bring metal to machines in compact arrangement



Trucks unloaded in 1/3 former time.

THE AMERICAN MONORAIL CO.

13103 ATHENS AVENUE

CLEVELAND, OHIO

a preference rating pattern for manufacturers will not give ratings high enough to get this material.

One suggestion is that in order to occupy non-integrated mills, strip and sheet tonnage be taken from the highly integrated plants, and part of this sort of tonnage, where its production is necessary, as well as plate tonnage itself, be transferred to the non-integrated mills.

The tonnage taken from the integrated strip mills, or at least a large portion of it, under the suggested plan would be supplanted by plate rolling. To this end it is contended that great and quick relief would be given to the pressing demand for plates.

As it is, the somewhat surprising report is prevalent that though plate demand greatly exceeds sheet and strip demand, the monthly production of the latter two products is approximately 1,000,000 tons, while output of plate even in the face of conversion of continuous mills to plate production is said to be about 875,000 tons a month. Present monthly defense requirements for plates are estimated at 1,250,000 tons.

WPB Lists Savings By Use of "NE" Steel

Washington

• • • WPB says that if the AISI or specifications for National Emergency Steels were followed to the fullest extent possible, 45 per cent less nickel, 34 per cent less vanadium, 27 per cent less chrome, and 21 per cent less tungsten would be used. These savings are also dependent on decreasing the amount of alloys used in such direct military items as gun steel where National Emergency specifications could not be employed.

It is admitted that the use of the NE specifications and other conservation practices would not result in savings of molybdenum, but this alloying metal would be increased to 10 per cent under this ratio, and the quantity of manganese would be increased to 30 per cent. In the cases of nickel and vanadium, the saving is partly theoretical because of heavy demand. There is not enough of these metals to make the percentages of saving real.

WPB says substantial savings in chrome can be made if open

hearth and electric furnace scrap is routed correctly. The ratio of recover of 1 per cent chrome content scrap was said to be about 90 per cent in electric induction furnaces, 60 per cent in electric-arc furnaces, but only about 15 per cent in the open hearth. In order to make this saving scrap must move from the open hearth to the induction furnace. Scrap moving in the opposite direction, it was pointed out, results in obvious losses in chrome.

WPB may crack down on wasteful practices by the issuance of appropriate orders in the near future. The NE specifications may become mandatory wherever possible, and this will apply to the armed services.

N. G. Burleigh Heads New WPB Office Machine Group

Washington

• • • The WPB Bureau of Industry Advisory Committees announced the formation of the Office Machinery Industry Advisory Committee.

N. G. Burleigh, chief, Industrial and Office Machinery Branch, is government presiding officer.

Committee members are:

Carl W. Breen, Autographic Register Co., Hoboken, N. J.; Harland W. Rippey, Bircher Co., Inc., Rochester, N. Y.; Lawrence V. Britt, Burroughs Adding Machine Co., Detroit; T. B. Hirschberg, Jr., Check-O-Meter Sales Co., Chicago; Ralph C. Coxhead, Ralph C. Coxhead Corp., New York; Merrill B. Sands, Dictaphone Corp., New York; Theodore W. Robinson, Sr., Ditto, Inc., Chicago; Harmon P. Elliott, Elliott Addressing Machine Co., Cambridge, Mass.; Carl M. Friden, Friden Calculating Co., Inc., San Leandro, Cal.; Thomas J. Watson, International Business Machines Corp., New York; Norman Sheras, A. D. Joslin Mfg. Co., Manistee, Mich.; Stanley C. Allyn, National Cash Register Co., Dayton, Ohio; C. G. Watkins, Simplex Time Recorder Co., Gardner, Mass.; and W. J. Bernart, Jr., Pitney-Bowes Postage Meter Co., Stamford, Conn.

WPB Personnel Changes

Washington

• • • WPB has announced the following personnel changes:

Joseph F. Ryan was appointed chief of the Construction Machinery Branch. Mr. Ryan is president of J. F. Ryan Associates, management engineers of Chicago.

H. C. Mesch was appointed chief of the Industrial Safety Equipment Section of the Safety and Technical Equipment Branch. Mr. Mesch was formerly chief safety engineer of the Soil Conservation Service of the Department of Agriculture, and was also connected with the Ralston Purina Co., St. Louis.

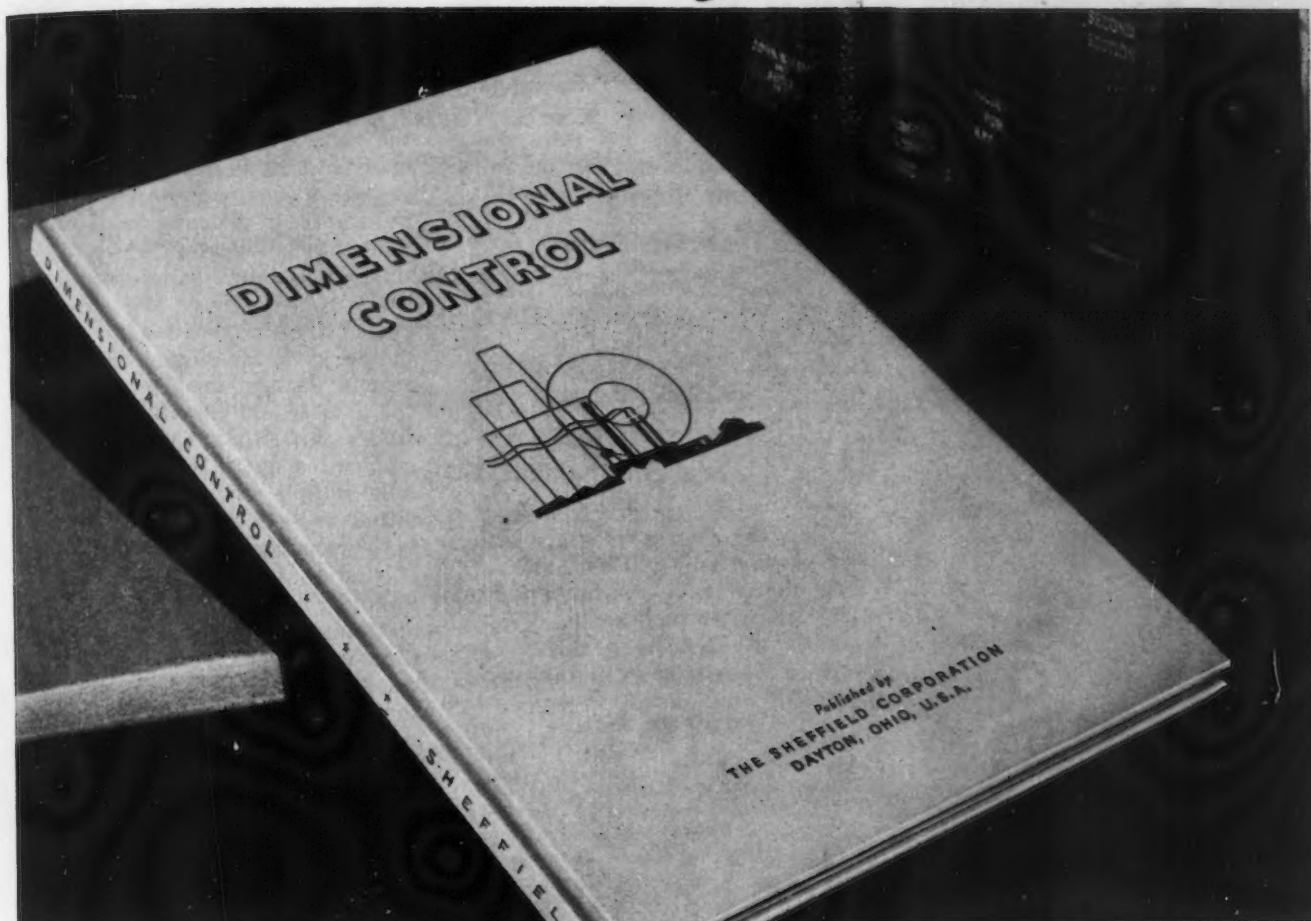
THE BULL OF THE WOODS

BY J. R. WILLIAMS



DIMENSIONAL CONTROL

A New Textbook



"Dimensional Control" is a new basic text on gages and their use in industrial inspection. It has been written for Engineering students, members of Defense Training Courses, and men in Industry who want a more complete knowledge of this phase of their work.

This is a 64-page book carrying 82 illustrations. It is $7\frac{3}{4}'' \times 10\frac{1}{2}''$ with a special stiff cover and cloth binding—price \$1.50 postpaid. Mail the coupon today in order to be sure to get your copy. The print order is limited.

THE SHEFFIELD CORPORATION * * * DAYTON, OHIO, U.S.A.



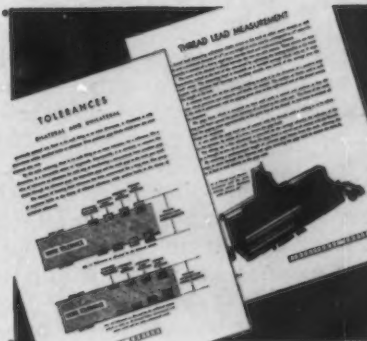
TECHNICAL PUBLISHERS

721 Shafer Ave., P. O. Box , Dayton, Ohio, U. S. A.

DEPT. A

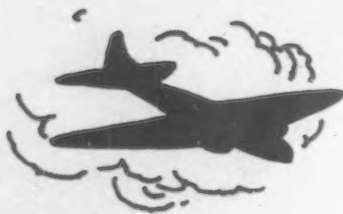
- ☐ Please send me C. O. D. . . . copies of "Dimensional Control."
☐ Please send on approval one copy of "Dimensional Control." I agree either to return the book in good condition or to send my remittance within 5 days of the time I receive it.

Name _____
Company _____
Position _____
Street and No. _____
City and State _____



WEST COAST.

• Decision near on whether shipyards will work three eight-hour shifts or two ten-hour stints . . . Subcontracting facilities available on Coast . . . Flying Fortress output doubled since Pearl Harbor.



SAN FRANCISCO—Conferences this week between San Francisco Bay shipbuilders and the War Production Board are expected to settle definitely whether shipbuilders here will be on three eight-hour shifts or two ten-hour shifts.

With the exception of the two Richmond yards operated by Henry J. Kaiser's Permanente Metals Corp., yards on the Bay have been unable to make fully effective the three-shift day, seven-day week agreed upon by the shipbuilders, War Production Board, Maritime Commission, Navy, and organized labor. Lack of skilled mechanics, and, most of all, lack of competent supervisors, has made the graveyard shift at most yards little more than a skeleton and has made impractical the staggering of shifts to enable full seven day operation.

As one large shipbuilder expressed it, "Only about 10 per cent of the workers have ever had any contact with ships before, and only about 25 per cent have ever had anything to do with steel." Former farmers, salesmen, clerks, and even barbers are found in the crews, now pushing close to 100,000.

By concentrating available supervisors on two ten-hour shifts, at least until training and experience catches up with hiring, the yards feel that they can get more production at less cost than if they

continue the pretense of working three shifts.

FROM the standpoint of the over-all per hour wage, the ten-hour shift basis is somewhat cheaper even though overtime is paid for the longer working day. On the basis of a six-day work week for the individual worker, the work and pay scale works out like this:

Three 8-Hr. Shifts

Pay, 5 Days	Work (hours)	Pay (hours)
1st shift	8	8
2nd shift	7.5	8.8
3rd shift	7	9.2
Day total	22.5	26
Five-day total	122.5	130
Pay, 6th Day		
1st shift	8	12
2nd shift	7.5	13.2
3rd shift	7	13.8
Total	22.5	39

Thus, 135 hr. per week are actually worked and 169 hr. paid for. Thus the average per hour pay is 1.251 times the base scale.

With two ten hour shifts, the work and pay works out this way:

Two 10-Hr. Shifts

Pay, 5 Days	Work (hours)	Pay (hours)
1st shift	10	11
2nd shift	10	12.4
Day total	20	23.4
Five-day total	100	117
Pay, 6th Day		
1st shift	10	15
2nd shift	10	16.9
	20	31.9

Thus, with two ten hour shifts, 120 hr. are worked during a six-day week and 148.9 hr. paid for. This ratio means that average hourly pay is on the basis of 1.241 times the base pay rate, slightly less than when three 8-hr. shifts are worked despite the apparently large chunks of overtime pay. On the ten-hour shifts, the workers enjoy 45 minutes for lunch, compared to only 30 minutes when the eight-hour shift is worked.

SLIGHTLY better working efficiency is claimed over the eight-hour shift where a 30-min. lag (15 min. for the men coming off and 15 min. for the men coming on) is said to be caused at each shift change by visiting and congestion in the yards. This would mean that one and a half hours were lost each day and nine hours each week. When the 10-hr. shifts are worked, the end of the first shift does not coincide with the

beginning of the second shift and there is no such time loss. In fact, the time between shifts may be used for equipment maintenance in an efficient manner. Now, equipment maintenance must be rushed and sandwiched into working time.

The transportation problem to the shipyards in this region, as in many others, is acute. The transportation companies must carry thousands of men to the job and take thousands away at the same time when shift changes are made three times a day. Because the end of the first shift does not coincide with the beginning of the second shift on the ten-hour basis, the jam would be alleviated considerably. The transportation companies could devote all available rolling stock to getting men either to or from work, instead of both ways, as at present.

Now that double time pay for Sundays and holidays has been eliminated, rotation of crews so that work goes on seven days a week is feasible either under a three shift plan or two shift plan.

IF the three-shift plan is substituted, more time will be available for training supervisors and workers before they are put on the job, it is argued, and consequently they will be better trained and more efficient when they do go to work. The training program so far has been nothing short of miraculous in its accomplishment, considering the scope and volume of training necessary.

Although organized labor has been a principal party to previous work plans involving hours, wages, and working conditions, its attitude towards the present proposal is apparently one of neutrality. The Bay Cities Metal Trades Council, the principal group affected, went formally on record endorsing a seven-day work week with three eight-hour shifts each day immediately after President Roosevelt's plea for around-the-clock work. At the same time, it agreed to eliminate Saturdays, Sundays, and holidays as the determining factor as to whether overtime should be paid, substituting as the criterion the number of days worked in any one week. Now that two ten-hour shifts have been proposed instead of three eight-hour shifts, the Metal Trades Council takes the atti-

job experience *eliminates* costly experiments

The "on-the-job" experience of Twin Disc Clutch Company's staff of field engineers combined with competent factory engineering design eliminates costly, time-consuming experiments with untried designs, untested ideas . . . that's why we believe "job experience" is one of the most valuable assets a clutch specialist has to offer the builder of high grade industrial machinery.

The Twin Disc Clutch Company's Engineering Department is ready to share their 24 years of experience in building *clutches to fit the job* with any industrial manufacturer who has a clutch problem. Write Engineering Department, TWIN DISC CLUTCH COMPANY, 1370 Racine Street, Racine, Wisconsin.

(1) *Twin Disc Reduction Gears* . . . a complete clutch power take-off and reduction gear assembled in a single unit for use with internal combustion engines in industrial applications up to a maximum output of 140 hp.

(2 and 3) *Twin Disc Models E and*

CL heavy-duty Clutches cover a complete range of sizes to transmit from 5½ hp. to 280 hp. per 100 rpm.

(4) *Twin Disc Power Take-offs* are available for use with internal combustion engines in industrial applications up to a maximum output of 285 hp.



tude that it is willing to do anything to increase production and speed victory.

A Council spokesman said, "It's up to the shipbuilders and the government." He also asserted that, in reality, two ten-hour shifts would only mean the loss of one hour's working time each day, apparently recognizing the time lost when changing eight-hour shifts.

A definite indication of how the rank and file feel about the 10-hr. shifts was the unauthorized walk-out from Kaiser's Permanente Metals Yard No. 1 in Richmond three weeks ago when word got around erroneously that the ten-hour shifts had been inaugurated at other yards. The Kaiser yards work eight-hour shifts.

A PRINCIPAL barrier standing in the way of a change to two 10-hr. shifts is the fact that the Kaiser yards are working three eight-hour shifts, and are fully satisfied with them. It is felt that it would be impractical to have the other yards on the Bay working two 10-hr. shifts while the Kaiser yards were working around-the-clock. Unless all the yards are on the same basis, it is felt that there would be an exodus of labor from the 8-hr. yards to the 10-hr. yards with consequent chaos.

Adoption of the two-shift day now would be no bar to three-shift operation later on, when more trained supervisors and experienced mechanics are available.

E XPERIENCED sub-contractors for the manufacture of aircraft parts are available in southern California, and are anxious for orders from Midwestern prime contractors unable to place work in their own community, according to Jack Frost, executive secretary of the Aircraft Parts Manufacturers' Association, Los Angeles.

"There is insufficient war business to fully utilize the present machine tool facilities in southern California," Mr. Frost told THE IRON AGE.

"The apparently prevailing opinion our plants are being overburdened with 24-hr. schedules is erroneous. Recently the Aircraft Parts Manufacturers' Association was told that prime contractors in the Midwest were having difficulty locating experienced sub-contractors in their own communities. There are still plenty of experienced firms with ample facilities available in southern California, especially among the smaller firms.

"Midwestern and Eastern prime contractors are missing a bet in not sending more inquiries for sub-contracting work to the West Coast."

The Aircraft Parts Manufacturers' Association is completing a job classification and wage rate survey. A 23-page questionnaire defining various jobs and rates has been sent to the 140 member companies of the Association, who employ about 50,000 persons. Results of the survey will form a basis for future labor and wage policies by the individual members.

PRODUCTION of Flying Fortresses by Boeing has been doubled since Pearl Harbor, and deliveries have been consistently on or ahead of schedule and are ahead of schedule at this time, according to Col. John S. Griffith, Army air force resident representative at the Boeing Seattle plant. Colonel Griffith, addressing employees over the plant's public address system, said that Boeing Fortresses are credited with the majority of the 62 enemy ships sunk or seriously damaged and the 50 Japanese fighter planes destroyed in the air by the U. S. bomber command in the Far East up to

March 1, based on reports made public.

"The Boeing Company's agreed schedule is a continually increasing one and the company has offered to increase it at a still faster rate but is now accelerating at as fast a rate as we are able to obtain materials and equipment for these planes," he said.

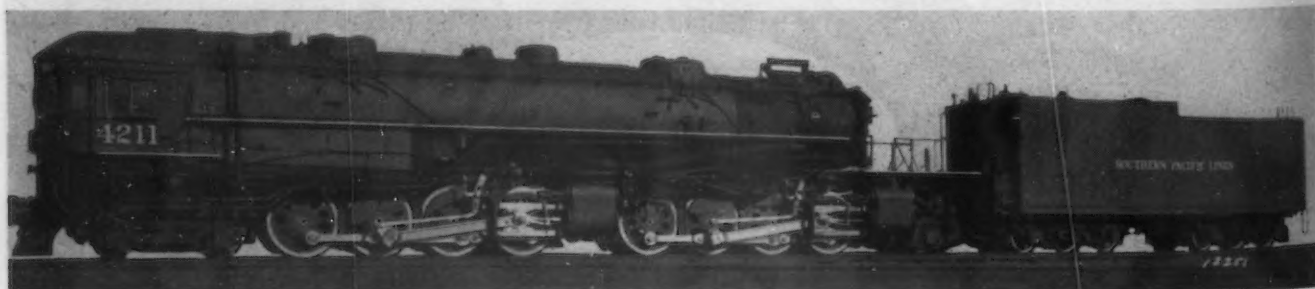
"These material schedules must be made to cover not only one company but the entire expanding armament program, and this is what governs the Boeing schedule. Supplies of materials and parts are continually increasing every month and every week. We will get them to you as fast as we can."

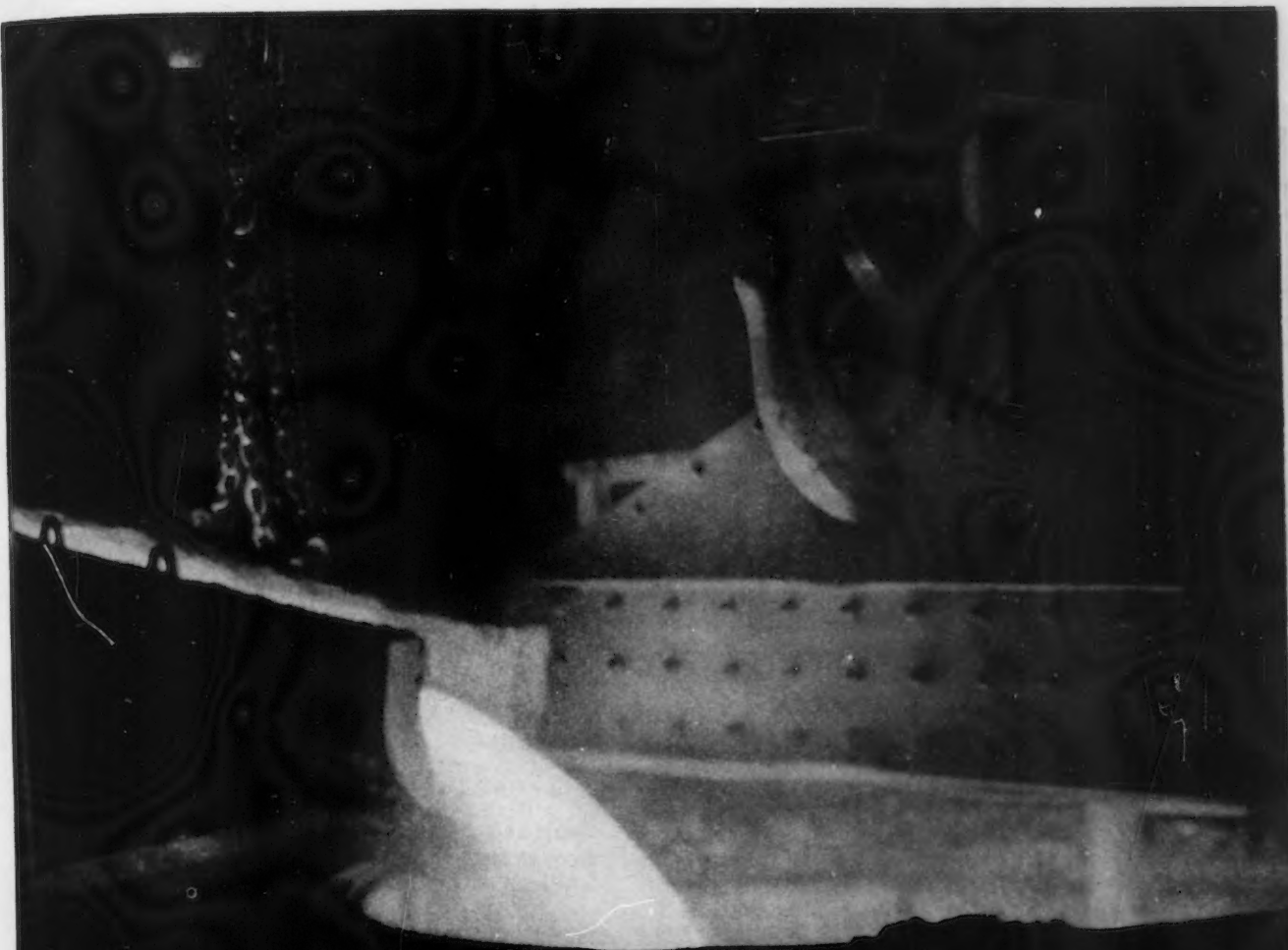
Further cooperation among bomber manufacturers was indicated by Boeing's announcement that it had turned over to Consolidated Aircraft Corp. of San Diego comprehensive information on the organization and methods of its flight and aero-dynamics department to aid the California company in establishing a similar test program. A seven-man flight engineering group from Consolidated has been sent to the Boeing plant to study the system.

Possibility of substituting plywood lifeboats for steel increased last week when a plywood boat built by Gunderson Brothers, Portland, passed tests for the Coast Guard satisfactorily. Results of the Portland tests were announced by Capt. William Fisher, supervising Coast Guard inspector for the Pacific Coast. The plywood boat holds 31 passengers and weighs 1700 pounds, of which only 150 pounds is steel. A similar steel boat weighs about 2500 pounds.

Washington and Oregon will need 200,000 more war workers by this time next year, figures of the regional labor supply committee indicates.

IT'S NOT BACKWARDS: To keep smoke out of the cab and increase visibility, this Southern Pacific oil burning locomotive has its cab in front. Completion of a current order for 70 of these engines by Baldwin Locomotive Works will give the line a fleet of 175 to meet accelerated passenger and freight schedules.





CONTINENTAL RESOURCES ARE

Keyed for Victory



Steel, and more Steel, is
Continental's all-out pledge to
KEEP 'EM ROLLING.

CONTINENTAL **ROLL AND STEEL**
FOUNDRY COMPANY

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Fatigue Cracks

BY A. H. DIX

Hot Air Raid Wardens

• • • I'm organizing a new division of the OCD—the Hot Air Raid Wardens. We will go around the country extinguishing those who substitute talk for action. I'm to be Grand Smotherer Supreme, but I'll need a lot of Regional Grand Smotherers. Would you like to be one?

—George Appel

Please send snuffer along with detailed instructions on how to use it, as we are not sure that we would know just what voices to still. It is true that the yen for action frequently evaporates through the vocal chords and that if you talk about a thing long enough it no longer seems necessary to do it. To paraphrase a fellow writer who made quite a name for himself, it becomes sicklied o'er with the pale cast of talk.

But that applies only to the talker himself. The effect on the listeners is exactly opposite. The act of listening in itself creates an urge for action. If some people are talking too much, others are not talking enough. And in keeping with our traditional trust in checks and balances, each Hot Air Raid Warden should be counterweighted by a Talk Stimulator, with authority to tickle the tonsils of those in key positions who aren't talking enough.

Gutenberg's Baby May Grow Up

• • • Printing is Here to Stay!

—Headline in *Paper Progress*

Now we can breathe easily. As the man said when laid off after being with the same firm for sixty years, "I wouldn't have taken the job in the first place if I had known it was to be temporary."

Grass Skirt Sells Pumps

I got a kick out of your "Every Little Movement" paragraph, and am enclosing a pump ad of ours, which uses a Hawaiian dancer to illustrate the headline, "Operates Without Mechanical Linkage to the Diaphragm."

I maintain our artist did as good, or maybe better, a job than the Wallace Barnes Co.

—E. D. Flynn, Chief Engineer,
Oliver United Filters, Inc.,
Oakland, Calif.

We prefer the Barnes girl. Too much of the Oliver girl's anatomy is on the ground.

Spats and Kid Gloves

• • • The term "trade paper" is as distasteful to the ear drums of this industry's brass hats as the word "hash" is to a restaurateur. But it has its friends, as instance this dissent from Willard G. Myers, Philadelphia advertising agency owner:

"I think 'trade paper' is an honorable name and always have. Advertising is my trade and I consider *Printers' Ink* a trade paper. When the trade paper associations started putting on kid gloves and wearing spats back in the other days and calling themselves 'business papers,' I never felt quite right about it."

We think it would be cowardly not to take a definite position, so we will come out flatfooted, lay our cards face up on the table, letting the chips fall where they may, and say its six of one and a half dozen of the other. Although we prefer "trade paper" to "business paper" we would not burn at the stake for either term, as neither is a close fit for your favorite family journal, which is a combination industrial journal, magazine, weekly newspaper, and fireside companion.



Big Boy

• • • We have always had a soft spot in our heart for the term "magazine," but the general publications have built a fence around it. For instance, *Advertising & Selling* says the August issue of *Mademoiselle*, with 404 pages, is "the largest magazine ever published."

In our league that's a mere pamphlet. We beat it at least once a year. Annual Numbers running over 700 pages are run of mine with us, and on Jan. 3, 1918, we got out a 868-page issue.

Linotyper Flubs "R"

• • • Deac just telephoned that the society page of the *New York Herald-Tribune* shows a photograph of a naval officer with his bride, captioned "Lieut. and Mrs. Blank shown at wedding deception." He wants to know whether we can do anything with it. Sorry. Outside our beat.

'Way Back in Cleveland's Time

• • • F. H. Fechtig, purchasing agent of the Atlantic Coast Line Railroad, writes that he has bound volumes of *THE IRON AGE* back to 1894. "Do you know of anyone," asks Oliver Johnson, our research director, "who has bound volumes farther back than that?" We don't, and if no other claimant—public libraries excluded—comes along before Apr. 10, Mr. Fechtig gets the pinochle deck—a card for each year.

Stomach Ulcer Prospects

• • • This photograph, clipped from an English industrial ad, showing a man in an airplane dictating to a typist, annoys a member of our brains department. "No man," he says, "has to be this busy."

Which brings up a point that we have often wondered about. It has to do with the stories of the giants who tumble out of bed at 5:30, do a day's work before breakfast, lunch at their desks on a sandwich and a glass of milk, and are in there pitching until ten at night.

Our belief is that either the stories are pure fiction or that the prodigies dawdle at half speed all day long. For mental batteries need a certain amount of time off for recharging. Never having seen a prodigy at close range, we admit that we are not handicapped by exact knowledge. However, the English have found that in shop work it does not pay to work a man more than 50 hr. a week. Above that the fatigue factor reduces the total output.

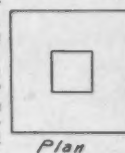
The same limiting element must apply to other forms of productive work, we assert hopefully, with ear cupped for "Amens!" so we will not feel guilty in continuing to catch the 5:33.

Puzzles

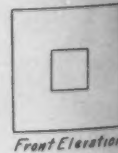
• • • Last week's 2-watt drain on your intellect is solved this way:

First the two sons cross, and one returns. The man crosses, and the other son returns. The two sons cross the river a second time, and one returns. The lady now crosses, and the other son returns. Finally both boys cross, and leave the boat on the farther side.

Lt. Com. A. R. Simpson sends this in and sets a par of 50 seconds: What is the side elevation for a construction with plan and front elevation as shown? herewith:



Plan



Front Elevation



Pumps

New Lamps for Old

...at a Saving!

YES, you *can* retire your old pumps and save money! Save vitally needed power, too. For improvements have made today's Fairbanks-Morse Pumps so much more efficient that they often pay for themselves by their savings in as little as a year.

They are superior mechanically, too . . . maintain their efficiency longer. More accessible, they are more likely to be kept in good condition, to continue their big power savings. And, due to volume production and advanced methods, they cost less. They can often be bought for little if any more than the cost of repairing the pumps they replace.

Your pumps may be consuming up to 25% more power than necessary. An F-M Pump Engineer can appraise their efficiency quickly and accurately. For consultation without cost or obligation, write Fairbanks, Morse & Co., Dept. D38, 600 S. Michigan Ave., Chicago. Branches and service stations throughout the United States and Canada.

FAIRBANKS-MORSE NON-CLOG SEWAGE AND TRASH PUMPS

A complete line of vertical-shaft and horizontal-shaft pumps for handling fluids containing large solids and much foreign matter, such as unscreened sewage, storm water, tannery waste, sardines, bagasse, food solids, and pulp.



FAIRBANKS · MORSE PUMPS

DIESEL ENGINES ELECTRICAL MACHINERY MAGNETOS RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS MOTORS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

Dear Editor:

40-HOUR WEEK

Sir:

Several times recently the President has said that the Wage Hour Law does not restrict our possible war effort because the employer has only to pay 1½ wages for time over 40 hours per week to get his employees to work more hours.

He stated that most producers were doing that to increase production and he did not want to favor any change in the wage hour law that would operate to reduce the weekly pay of workers. The President is obviously not well informed.

According to U. S. Labor Department and National Conference Board reports, both reporting on an overwhelming majority of the employers of the country, the average weekly hours worked equals 42.4 hours.

At this rate a man earning \$1.00 per hour would receive \$40.00 plus \$3.20 equals \$43.20 per week.

If the work week at straight time was raised to 48 hours that same man working full time would earn \$48.00 per week.

Assuming equal efficiency each man would receive more money and the war production per man would be increased 48 divided by 42.4 = 13 per cent.

Such a change in the Wage Hour Law would increase the worker's income and increase his production at no increase in the cost of war goods.

*F. W. Jessop, President,
The Ohio Electric Mfg. Co.,
Cleveland, Ohio.*

Opinions differ among employers on the 40-hour base week. For an employer's reason for favoring the 40-hour week, see comments by Hugh H. C. Weed, vice-president Carter Carburetor Corp., page 69, April 2 issue.—Ed.

PALM OIL

Sir:

We wish to avail ourselves of your standing invitation to subscribers, and inquire whether or not you have any data available on the consumption of palm oil by the steel industry during normal years.

*Maurice Reswick,
Standard Oil Co. of Penna.,
Pittsburgh, Pa.*

Maximum consumption of palm oil by the steel industry for any one year was 20,000 tons, so the yearly average would be somewhat below that, but just how far below we do not know.—Ed.

"LET THE WAR WAIT"

Sir:

Being a structural engineer with the Construction Division of the War Department, I am a regular reader of *THE IRON AGE* and particularly the

articles signed by J. H. Van Deventer which are always admired for the common sense and frank expression.

I have just finished his article "Let the War Wait" in the March 26 issue, and its logic and statement of fact as we understand them to be at this time are so appropriate that I request three (3) copies or reprints of this article if such are available in order to submit one copy with some accompanying personal comments to each of my Congressional representatives from Pennsylvania—my original home state and present voting precinct.

*William
Washington, D. C.*

Sir:

Permit me to lift my voice in applause for your stirring editorial, "Let the War Wait," in the March 26 issue. It certainly is worth reading.

*P. C. Sowersby,
General Electric Co.,
Lamp Dept.,
Nela Park, Cleveland.*

SHELL MANUFACTURE

Sir:

Please advise if you have available in form of reprints or book form all the data you have published in the past year or six months, regarding the manufacture of shells, both different methods of forging and the machining of the shells.

*C. W. Rothe,
FI-RO Machine and Welding
Works,
Natchez, Miss.*

Articles on shell and cartridge manufacture have been reprinted in the form of a 68-page booklet, price \$1.—Ed.

DISCOUNT BOOK

Sir:

We thought perhaps you could inform us where we might get a book which we require. What we want is a plain multiplication table and not a payroll or discount calculator. We might best illustrate this by taking the item of bolts.

We get out a net item price sheet on bolts. As an illustration, we would want to figure, say 62½ per cent off of the list price of the various sizes of bolts in order to arrive at the net price. This is a plain multiplication table, of course.

Do you know of such a book?

*L. J. Larzelere, President,
Farquhar Machinery Co.,
Jacksonville, Florida.*

You want a discount book. A good one is "Ladd's Discount Book," sold by Henry Fasig, 37 Pardee Place, East Haven, Conn.—Ed.

BLUE PRINT READING

Sir:

I note, in the issue dated March 26, on page 108, reference to a new approach to reading blueprints. Please advise how I may obtain more information on these films and if the films can be rented.

*T. V. Hilt,
Wendt-Sonis Drill Works,
Hannibal, Missouri.*

Write to Film Productions Co., 1504 Hennepin Ave., Minneapolis.—Ed.

BOLIVIA AND TIN

Sir:

I have seen the Feb. 19 issue of *THE IRON AGE* wherein you publish a very interesting article about Bolivia and tin. I publish a magazine entitled "Bolivia" and I was wondering whether you would allow me to reproduce a resume of said article.

*J. Gutierrez Guerra,
Consulado General De Bolivia,
New York, N. Y.*

Permission granted.—Ed.

PEARL'S HOME

Sir:

On page 82 of the March 5 issue, "Fatigue Cracks" section, you quote Dr. M. G. de Chazeau as saying:

"It (steelmaking cost) changes in a stable way, namely, that the variable cost is a constant and varies with the output."

I have looked over the verbatim record of TNEC proceedings, Volumes 9 and 11, and haven't found this "pearl" of logic.

Being very much interested in everything connected with the steel industry, particularly, when interpreted and illustrated by such specialists as Dr. de Chazeau, I would appreciate your showing me where this expression was found.

*F. F. Foss,
Wheeling Steel Corp.,
Wheeling, West Virginia.*

See page 13,639, volume No. 26, report of TNEC hearing, entitled, "Investigation of Concentration of Economic Power," issued by Government Printing Office in 1940.—Ed.

GOVERNMENT AWARDS

Sir:

Up until recently, you used to publish monthly, a list of the Government Awards for defense work.

Can you tell us where such a report may now be obtained and at what cost?

*C. W. Davisson,
The Mitchell-Bradford Chemical Co.,
Bridgeport, Conn.*

Lists of Government Awards can no longer be obtained anywhere, as the Navy Department and War Department have stopped issuing them because of their possible value to the enemy.—Ed.

"Put About!"

Like a huge
ship that has left its set course to go to the aid of another, American industry has turned its unparalleled resources to the gigantic task of shouldering the war production program. The one job on hand has precedence over every other consideration—and only when the task is finished can the original voyage be resumed.

It has become the specific duty of Transue, under this emergency program, to apply its every facility for designing and producing pressed steel stampings to the filling of war needs . . . to direct the many advantages of pressed steel solely towards the furthering of the war effort. This is the one all-important job today—but it is a job which, through enriched experience and extended effort, is equipping Transue for still greater service in the peacetime sailing of the near future.



TRANSUE & WILLIAMS
ALLIANCE • OHIO
DESIGNERS AND MAKERS OF DEEP DRAWN STAMPINGS

SALES OFFICES: NEW YORK, PHILADELPHIA,
CHICAGO, DETROIT, INDIANAPOLIS, CLEVELAND

This Industrial Week . . .

NEW restrictions on use of steel in hundreds of consumer products are now closing with crushing force on many scores of metalworking plants and are compelling more sections of industry to realize that to live they must get war work.

Events this week and next will show U. S. industry that the war program, with its tremendous need for materials, has passed beyond the stage where only the big metal consumers like the automobile plants get orders to stop peacetime production. Little steel consumers are finding themselves hit as hard for the pounds of metal they use in non-essential products as the big consumers were hit for their large tonnages.

Subcontracts Are Eagerly Sought

While many small plants now facing shutdowns for lack of steel and other materials will not be able to fit into war production, others are fighting to get such essential business. Interest in subcontracting is soaring under the impact of the new WPB restrictions and demand for information about the priority system—under which the government controls material distribution—is growing steadily. In this situation, the maker of bobby pins may be cheered by knowledge that material which might have gone to his plant will find a better use in Russia.

For another week, demand for steel for Army, Navy, Maritime Commission and lend-lease use has broadened, with the emphasis on lend-lease. For the second quarter of 1942, lend-lease steel requirements will far more than double such shipments in the last three months of 1941. Much of this material, earmarked "Rush," is superimposed on the already unprec-

edented demand from U. S. agencies. Already competition for steel among the Big Four war consumers is reported and many steel plants this week were running solely on allocated and A-1-a and A-1-b orders. Some producers are able to go down to A-1-f but lower rated business is continually being pushed aside. The increase in the amount of steel production which represents outright allocation and orders in the A-1 series is creating a situation under which complete allocation of ingots and semi-finished steel is likely. It is understood that the entire steel distribu-

The roundup of priority news appears this week on pages 102-111. The price news begins on page 96.

tion system is becoming so tight that the War Production Board Iron and Steel Branch is actively studying the feasibility of having the steel mills submit rolling mill schedules on sheets, bars and structural steel. All of these items may come under the mandatory allocation similar to that already applying to plates.

Probability of allocation of steel ingots is a threat to many non-integrated mills, since some of these units have been shipping as much as 30 per cent of their production to non-rated customers. Some non-integrated producers hold a very high percentage of A-1-a work and are not frozen out of semi-finished supplies by any steps taken so far.

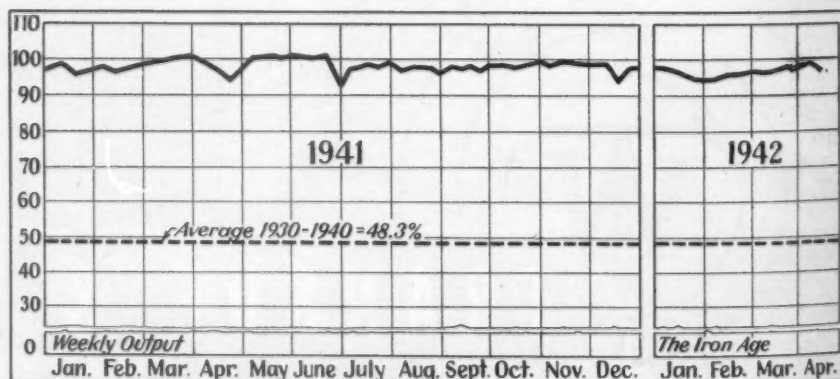
Invasion Barges Being Built

Few days pass without some new demand for steel plates. Placing of large orders for invasion barges soon is likely to add to the difficulties of the WPB's allocation of plates. Some of these barges are already understood to be under construction in the midwest, in a program which is bound to be helped from the viewpoint of material, by the development of the cast all-welded tank.

March plate shipments of 878,726 tons reached an all-time high and included deliveries of 306,195 tons from strip mills. February strip mill deliveries of plates were 268,-

Steel Ingot Production—Per Cent of Capacity

(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity

	Pitts- burgh	Chi- cago	Youngs- town	Phila- delphia	Cleve- land	Buf- falo	Wheel- ing	South	De- troit	South Ohio	West	St. Louis	East	Aggre- gate
Last Week.....	100.0	104.5	100.0	91.0	95.5	109.5	83.0	98.0	105.0	104.0	97.0	103.0	102.0	99.0
This Week.....	99.0	105.0	99.0	91.0	93.0	104.5	83.0	98.0	102.0	100.0	97.0	95.0	105.0	98.0

988 tons. Deliveries to shipyards for the Maritime Commission were 30 per cent higher in March than in February, and were proof of the rising effort in U. S. shipyards to cancel effects of submarine sinkings. Several midwest plants are expected to figure shortly in the pre-fabrication of cargo vessels.

Lack of plates in the great quantities needed is spreading confusion among the railroads where a restriction of carbuilding for the rest of this year is considered a threat to the war effort. Many thousands of freight cars representing unfilled backlogs in the car shops may never be built. The original 45,000-car program set up by the OPM and SPAB probably will not be completed before June. Almost 9400 domestic freight cars were completed in March.

Rating for Tin Plate

Late last week tin plate producers were notified by WPB that an A-1-a priority rating had been authorized for tin plate, terne plate, and black plate for the production of cans and containers covered under Tables 1, 2 and 3 of Conservation Order M-81. This action seems to clarify once and for all the position of this urgently needed product following a series of steps which originally found tin plate almost the only strategic material without a priority rating. The A-1-c rating granted tin plate and black plate a few weeks ago was too low to compete with other flat-rolled requirements which either were allocated or had A-1-a ratings. It is noted, however, that caps and closures, excluding crowns, which are used extensively in food packing, as yet have no clarification through a priority rating. Permission to use caps and closures for certain food packing has been granted but priority action to obtain steel still was lacking at midweek.

Plan to Relay Oil Pipe Lines

Industry noted this week that the 1820-mile oil pipe line project from Texas to New York, proposed to offset effects of tanker sinkings, has been revived. Oil industry groups are said also to have advanced plans for the laying of a vast relief system of pipelines by digging up and

relocating more than 1400 miles of second-hand line pipe and installing large quantities of used tankage and pumping equipment. Some of the relaid pipe would be placed 500 miles from its original location. A new appeal for material for the Texas-to-New York line, set aside last year despite strong sponsorship by Oil Coordinator Harold L. Ickes, is expected to be made to the War Production Board.

Large Tonnages Of Bars Coming

Illustrating the swift pace of defense plant building, more than 200,000 tons of concrete bars are yet to be placed for top priority projects. This demand will be fully met on schedule, according to informed sources. Reinforcing steel awards for the week are estimated at 26,230 tons, against 37,950 tons last week. The week's new reinforcing projects dropped temporarily to 500 tons from 5300 tons a week ago. Structural steel awards, on which details are no longer printed because of censorship regulations, are estimated at 29,585 tons against last week's lettings of 33,500 tons with new projects of 23,000 tons compared with 51,900 tons a week ago.

Steel Output Down One Point

After rising for five consecutive weeks, steel production in the U. S. this week declined narrowly. Output is estimated by THE IRON AGE at 98 per cent of capacity, a drop of one point from last week's 99 per cent rate. The level in the comparable week of March was 96 per cent. While the scrap supply situation is still by no means satisfactory, district reports to THE IRON AGE indicate that the current week's loss is due primarily to routine repair work.

With the exception of Chicago, where operations rose a half point to 105 per cent of capacity, most of the larger steel-making areas show slight losses in ingot production. Pittsburgh and Youngstown both are down a point to 99 per cent and Cleveland is off 2.5 points to 93 per cent. Philadelphia's steel rate is unchanged at 91 per cent while loss of four points to 104.5 per cent is shown at Buffalo, three

points to 102 per cent at Detroit, and four points to 100 per cent in the South Ohio area. Wheeling and Birmingham are unchanged at 83 and 99 per cent, respectively. The eastern seaboard gained three points to 105 per cent and the St. Louis district dropped eight points to 95 per cent.

March shipments of finished steel products by U. S. Steel Corp. subsidiaries totaled 1,780,938 net tons against 1,616,587 tons in February and 1,720,366 tons in March, 1941. For the first three months, shipments were 5,136,418 tons compared to 4,951,271 tons in the corresponding period of 1941, a gain of 185,147 tons. Shipments for March are the highest recorded for that month in the corporation's history and the first quarter total is the highest for that period on record.

Ore Interests Study OPA Order

Iron ore interests still are studying the OPA price freezing order, preparatory to submitting to Washington a record of the prices at which their term contracts and spot sales were made last year. Iron ore producers are likely to request the OPA to clarify prices of ore sales made to consumers who were in a position to transport their purchases on their own lake ships, or who had been repaying the rail freight to the head of the lakes. Apparently the OPA overlooked arrangements of this nature in preparing the price ceiling. Meanwhile, ice in Lake Superior has been slowing down the movement of ore vessels, resulting in considerable congestion at some points.

Work Wanted In California

Despite the inundation of some industrial areas by war business, the Aircraft Parts Manufacturers Association of Los Angeles, this week told THE IRON AGE that "there is insufficient war business to utilize fully the present machine tool facilities in Southern California." Experienced sub-contractors for manufacture of aircraft parts are said to be anxious for orders from midwestern prime contractors unable to place additional work in their communities.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U.S.A.



since 1892

ENGINE

TOOL ROOM

AUTOMATIC LATHES

SPEEDING THINGS UP with two carboloy tools in four-way tool block and six high-speed tools in special tool plate on rear rest. This 18" Lodge & Shipley Manufacturing Lathe, with multiple length stops and multiple diameter stops, brings speed and accuracy to the job.

News of Industry

• • •

North Penn Plant Pool on War Orders Stimulates 7 Towns

By T. E. LLOYD

• • • Out in the rolling hills of northeastern Pennsylvania, not far from where Washington and his Continental Army camped during the bitter winter of 1777-1778, are the small towns of Lansdale, Souderton, Telford, Doylestown, North Wales, Perkasié, and Hatfield. This area, steeped in American history, has been trying unsuccessfully to "get into the war" by utilizing existing manufacturing facilities to do a war production job. Most of the manufacturers in the area, hit hard by priorities on materials, have been faced with closing up shop for the duration unless war work could be found.

Because the plants are small, it was impossible to obtain war work. No one could contract for a given production job because the restricted variety and number of machines in any shop limited the type of work that could be done. The small plant operators had neither the knowledge of how to obtain war contracts nor the capital or legal experience to negotiate them.

Working as plant manager of one of the larger plants in the area, the Turbo Machine Co., subsidiary of Dexdale Hosiery Co.,



International News Photo

JEEP GOES SWIMMING: An experimental amphibious personnel carrier, built along the lines of the Jeep, is being tested at Fort Knox, Ky. The engine, mounted in the rear, drives the wheels on land and a propeller when in the water. This pet of the Army will easily do 60 mile per hr. on the highways.

H. A. Matthews, known to his friends as "Matty," searched for a way to keep his plant operating. His shop employed only about 50 men, and contained the usual assortment of lathes, planers, milling machines, drill presses and other machines. It was felt that these machines could and should be put to work making parts for the Army, Navy, Lend-Lease, and other defense agencies. Naturally, the first place to go was Philadelphia, where the Army and Navy had procurement offices, and the OPM had an office.

Here, Mr. Matthews ran into trouble. First, the restricted variety of machines in the shop limited the type and amount of work that could be handled. Then, of course, he had no idea as to how to go about getting a contract, even when he knew there was a job scheduled that the shop could handle. After many tries, how-

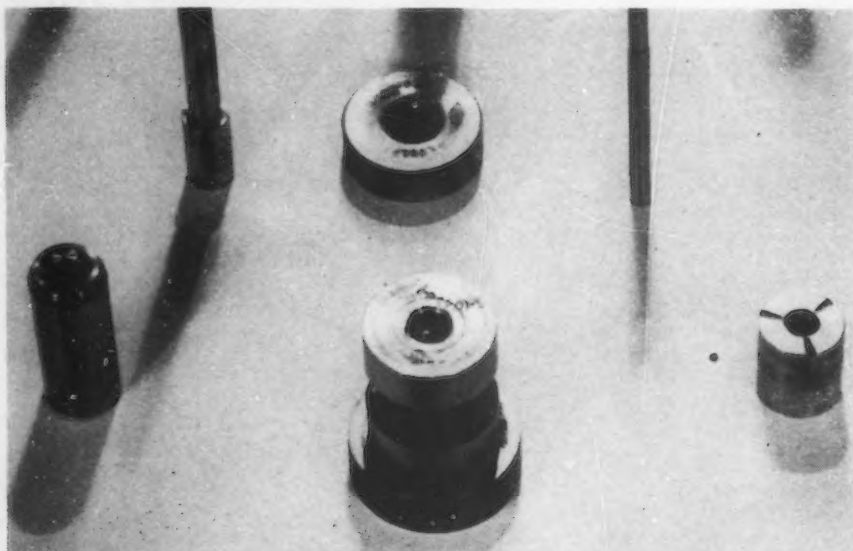
ever, an \$800 contract was obtained which was quickly completed and delivered to the Navy. However, after completion of the contract, Matthews was again out in search of work for the plant.

About this time, he met A. A. Cutting, who was in charge of the organization of "mother hen" manufacturers' pools in eastern Pennsylvania, and it was Cutting who finally got things straightened out on handling war contracts. Mr. Cutting, with Mr. Matthews and K. D. Montgomery of Hunter Pressed Steel Co., formed a pool of 19 small shops and plants within a radius of about 15 miles of Lansdale. They normally manufactured a variety of steel, iron and brass products. This pool is known as the North Penn Valley Facilities Group. These 19 pool members together could handle almost any metal machining or forming job, because together they

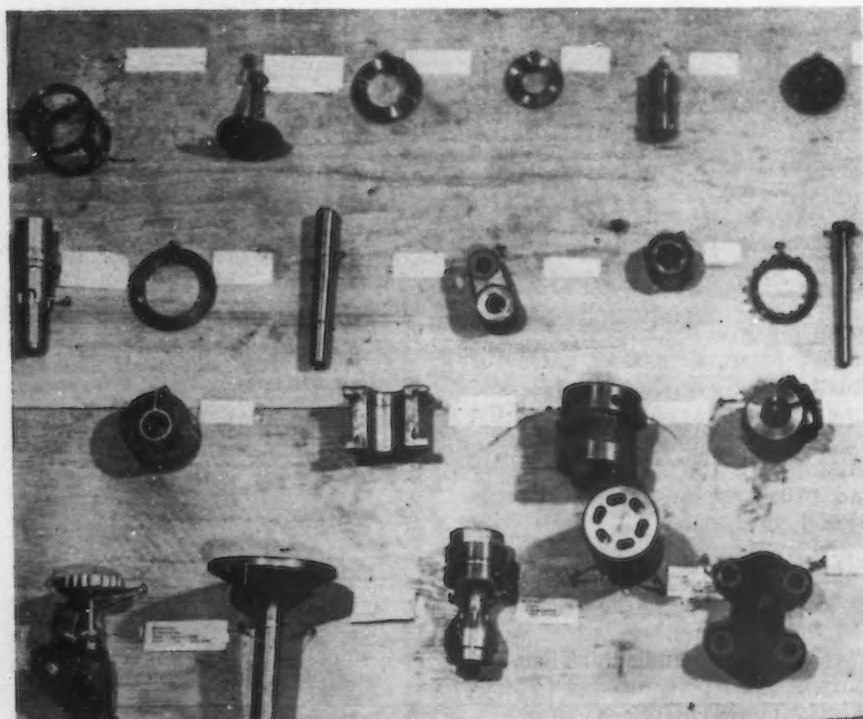
had a complete line of machine tools, sheet metal tools, heat treating, and foundry facilities.

A survey was made of all available tools in the group, and such tools were indexed as to kind, type, size, capacity, age, condition and owner. Included in the group were standard, multiple, and sensitive drills; engine and turret lathes; millers, planers, grinders, shapers, screw machines, punch presses,

hydraulic presses, saws, welding equipment, boring mills, plating and polishing equipment, gray iron and non-ferrous foundries, heat treating equipment, testing machines, wire straighteners, spring coilers, and a variety of other miscellaneous tools. Indexing the equipment of the pool members permitted a quick and easy check on who had machines that would be available for any type of work.



THE SMALL SHOP WORKS: Keeping the small shop and plant in operation with sub-contracts is the task of the pool set-ups in Eastern Pennsylvania. Parts like these can be turned out with limited manufacturing facilities, and collected by the prime contractor for assembly into a major unit.



POOL PARTS: Parts such as these are made by the North Penn Valley Facilities Group. The 19 member shops in the pool are now working on about \$150,000 worth of orders for automotive parts.

One important feature of the organization of the pool is that no shop loses its individuality. A manufacturer can refuse to accept any job or part of a prime contract because of work he is doing, because the price isn't right, or for any reason known only to himself. However, being a member of the pool entitles the plant operator to go to the pool head and seek work direct from the pool, rather than to attempt to get it from procurement offices. The individual pool member may take a prime contract himself if he can land it, and handle it entirely within his own shop if he wishes. He is not responsible to the pool to turn over such work for general distribution.

A prime requisite of the pooling system is that of building the pool to do not one, but a variety of jobs. Pools throughout the country have failed simply because they were built around a single large contract. The pool must be equipped to handle almost any type of job that comes along, and cannot afford to be too specialized, either in equipment or personnel. Furthermore, the pool must have a head, or a management. It is this function that Turbo Machine Co. and Hunter Pressed Steel Co. perform. The pool head must assume the responsibility for the contract, be able to furnish technical aid to the sub-contractors, and negotiate with procurement offices of the contract. Tools in the pool must be studied, and only such jobs as can be handled by a small plant can be allocated to it by the pool head. It is the pool head's responsibility if the work falls behind schedule, and consequently, so far as pool actions are concerned, the pool head is the boss.

Fundamentally, what has happened at Lansdale is that instead of a group of small shops there has been organized a huge machine shop with complete facilities, but spread over a great area. Turbo Machine Co., and Hunter Pressed Steel Co., being the largest operators in the group, naturally take the initiative to go after contracts, bid on them, furnish the necessary financial, technical, and legal help, and then feed the work to the pool members. Cost experts with these larger firms figure on the jobs, and it is the figured costs of the parts to be made that pool members must

meet. Occasionally a cost is figured too low, and the pool members refuse to accept the job on the estimated basis. Adjustments then must be made between the small plant operators and the prime contractors.

The "mother hen" machinery and manufacturing pool system set up as the North Penn Valley Facilities Group has turned out to be the salvation of the small manufacturers in the area. Likewise, about 11 other pools in other areas have been formed on the same basis, and are doing much to aid the small manufacturer to obtain war work and to increase production of war machinery for the government. In addition to keeping plants in operation, the pool at Lansdale has done much to build up the morale of the people in the community. Enthusiasm is high both among pool members and in the town itself. The war work coming into the area has made the communities "war conscious," shops have added machinery and increased personnel and payrolls, and community stores and business houses are reporting increased buying activity. Shops that formerly worked a single eight hr. shift have increased personnel sufficiently to operate 16 and 20 hr. a day for seven days instead of the usual five and six-day work week. Furthermore, co-operation between heretofore competitors is unusually apparent.

An example of the work being done by the North Penn pool is the conversion of a popular make of automobile engine for use as auxiliary power in a new type of boat. Motors are received completely assembled for installation in an automobile. Turbo Machine Co., which is the prime contractor for this particular job, receives these motors in large lots, and, as work is begun on them, strips off the fan belt assembly and other incidental parts, to adapt the motor for marine work. Included in the conversion of this motor is the complete radio shielding of all parts, installation of an instrument panel, complete rewiring, installation of the generator, and assembly and installation of all accessory equipment. Some 500 parts must be made and fitted to the motor before it is complete and ready for delivery.

Turbo Machine Co. shops manu-
(TURN TO PAGE 86, PLEASE)



British-Combine Photo

NEW FLYING FORTRESS: B-17E, the new Boeing flying fortress has been described by the War Department as "bigger and more deadly" than any of its predecessors. Under a special tri-company production pool arrangement, Douglas, Vega and Boeing Aircraft Cos. will have these ships rolling off the production lines in quantity within a very short time.



International News Photo

IT ISN'T A BOMB: To augment the normal fuel supply, this bomb-shaped belly-tank has been built under the Bell "Airacobra." The tank can be dropped in flight after the gasoline has been consumed.



AP Photo

LANDING FIELDS: This ground crew is unrolling a layer of steel mesh for an airplane landing field. One advantage of this English type mat is that grass grows through the mesh and screens it from enemy observation planes.

DoAll *meets the Challenge*

This remarkable Contour Machine is speeding along the steady flow of vital equipment for army, navy and air force by doing a lion's share of cutting tough metal and alloy parts of every description in airplane plants, arsenals, shipyards, etc.

On hundreds of production jobs, DoAll is doing a week's work in a day, a day's work in an hour, an hour's machining in 10 minutes.

DoAlls range in price from \$1,000 to \$5,000 complete with necessary equipment; yet are relieving \$10,000 to \$50,000 machine tools of over-load work with valuable savings of time and metal.



AIRPLANE SKIS

Made on the DoAll. Operator is cutting 12 pieces of .0125-24 S.T. Duralumin at the same time. A single ski has 24 separate cuts. Formerly cutting was done, one at a time with large hand shears.

DoAll
Contour Sawing
BAND SAWING
BAND FILING
BAND POLISHING

★ Fastest precision method of removing metal

C O N T I N E N T A L

Associated with the DoAll Company, Des Plaines, Ill.,
Manufacturers of Band Saws and Band Files for DoAll Contour Machines.

ge for faster

PRODUCTION

Keep the planes, ships and bombers coming! That's the demand on American industry today. Every ounce of energy, every improved method to increase output must be used.

NOW... AND WHEN PEACE COMES

Whether you are doing war work on direct or sub-contract, you need the DoAll—the most versatile machine for production.

And—when the war is over, the DoAll won't have to be scrapped, but can be put to immediate work on your shelved peace-time orders without changing a single nut or bolt.

Available are 42 different sizes and styles of band saws, 23 band files, 3 polishers, a "best" one for every kind of work.

Let us send a factory trained man to show you just what the DoAll can do for you now and later.

AGITATOR MOLD

At Emmett Mold, Inc., this Washing Machine Agitator Mold was made in 13½ hours on the DoAll. Material is Chrome - Vanadium Steel 10" thick, 18" diam., weighing 720 pounds.



HAMMER DIE

At American Fork & Hoe Co. this 10" thick Hard-ten Tool Steel Forging Die to make hammers was cut on the DoAll. Saving was about 60% in time and a great amount of metal over any other method.

AIR CONDITIONING DUCTS

At Char-Gale Mfg. Co., 50 parts are cut at a time from 30-gauge galvanized iron. Operator can cut 1000 or more parts a day, which is 3 to 4 times faster than the old method, one at a time with hand tinsnips — and a much neater job.



MACHINES, INC.

1311 S. Washington Ave., Minneapolis, Minn.

NEW—Send for the interesting and helpful book "DoAll on Production"

DoAll
Contour Sawing
BAND SAWING
BAND FILING
BAND POLISHING

(CONTINUED FROM PAGE 83)

facture about 300 of the required parts, including special fastening devices, rods, shafts, some of the gearing, and the machining of castings. The remaining 200 parts are farmed out to the small plant sub-contractors who cast various parts of bronze and gray iron, weld assemblies, build panel boards and instruments, machine some parts, and perform other tasks on parts that go into the complete assemblies.

All material used in the work is purchased by the prime contractor, and is doled out to the small plants as needed. The plant operator when he takes a part to be manufactured, picks up the material, completes his work on it, and returns it to the prime contractor, who then assembles the motor for delivery. Motors now on hand to be converted represent \$150,000 in contracts, and there was, subsequent to the original contract, a substantial contract for replace-

ment parts awarded to Turbo Machine Co.

Sub-contractors included in the work on the motors total about eight of the 19 pool members. Other contracts held by Turbo Machine Co., and by Hunter Pressed Steel Co., keep the majority of the remaining pool members busy. Members of the pool include: Hunter Pressed Steel Co., Turbo Machine Co., Safe Guard Corp., Lansdale Porcelain Enamel Corp., Lansdale Machine Co., T. W. Keller, Perkins Glue Co., Rex and Erb, Werner Foundry, Hosiery Patents and Lansdale Nipple Co., of Lansdale; Harvey D. Sampey, of Telford; Richmond Ring Co., of Souderton; Edison Machine Shop, of Doylestown; North Wales Foundry Co., of North Wales; V & M Tool Co., and Stater Instrument Co., of Perkasi; and Hatfield Machine Co., and Alfred Hopkins & Sons, of Hatfield.

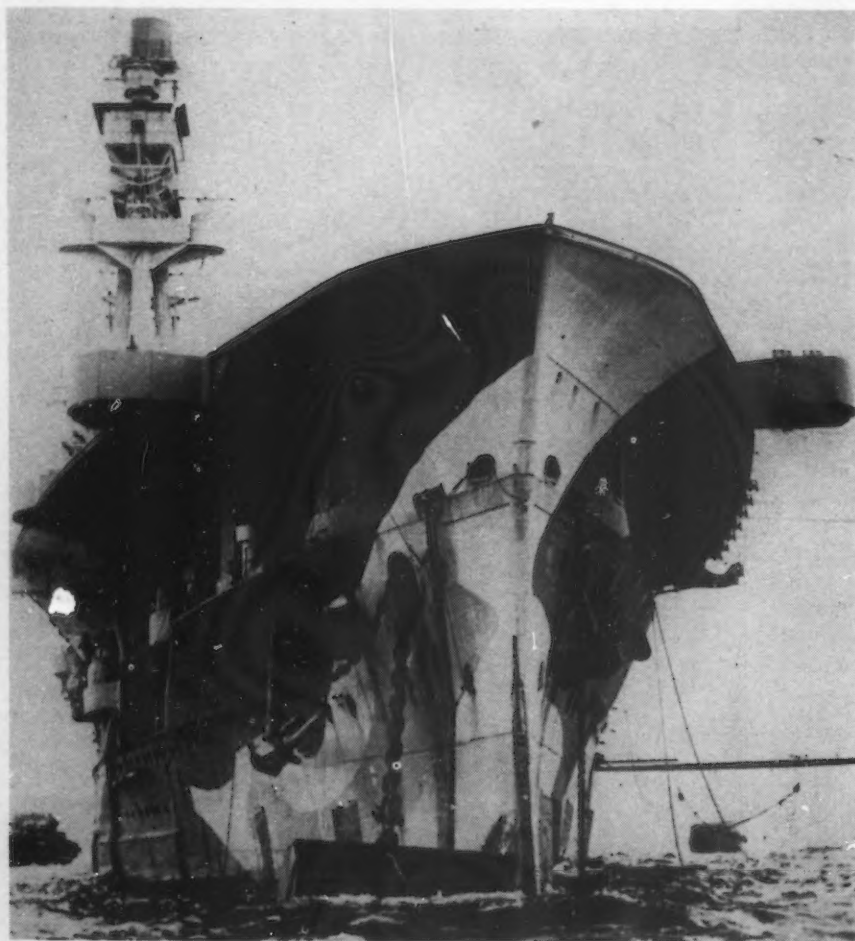
Tools owned by members of the group include: 35 plain drill

presses, 35 sensitive and bench drill presses, 10 multiple drill presses, 7 turret lathes, 76 engine lathes, 54 millers, 6 planers, 48 grinders, 12 shapers, 1 screw machine, 57 punch presses, 31 power presses, 1 hydraulic press, a wide variety of power saws, arc and gas welders, 53 vertical boring mills, cleaning, plating and polishing equipment, and a wide range of miscellaneous tools such as threaders, keyseaters, buffers, power hammers, and sanders. Two of the three foundries in the group handle cast iron and can produce about 300,000 lb. of castings a week, while the third foundry is a non-ferrous shop equipped to handle about 4000 lb. of brass and 1500 lb. of aluminum a day. Heat treating shops, of which there are four, are equipped with gas, oil, and electrically heated oven, pot, and muffle furnaces, annealing furnaces, tempering furnaces, and baking and hardening ovens, as well as metal testing equipment. In addition, there is one firm that has a wide assortment of wire forming and testing equipment.

The North Penn Valley Facilities Group pool has brought the war to the sleepy little towns in northeastern Pennsylvania in the form of work to be done to keep the armed forces equipped with fighting implements.

THE ROOST: The British aircraft carrier, H.M.S. Eagle, is shown here anchored at an undisclosed port. Its eaglets should spell trouble to the Nazi forces.

Wide World Photo



Detroit Firm To Use Armco Plant for Shell Making

Middletown, Ohio

• • • Manufacture of steel artillery shell casings will be started soon by a Detroit company at one of the American Rolling Mill Co.'s plants, Calvin Verity, executive vice-president and general manager, announced recently. Armco will make available buildings and equipment and will supply the special steel blanks from which the casings are made. Armco employees will be given an opportunity to work on the project.

Alabama Stack Off

Birmingham

• • • Pig iron production in Alabama has slightly declined with Sloss-Sheffield Steel & Iron Co. taking off its No. 3 furnace for relining. Sloss-Sheffield officials said the stack, taken out of production April 8, probably would be back in blast in 10 to 12 days.

Need Seen for More Coordination of WPB Steel Branch Units

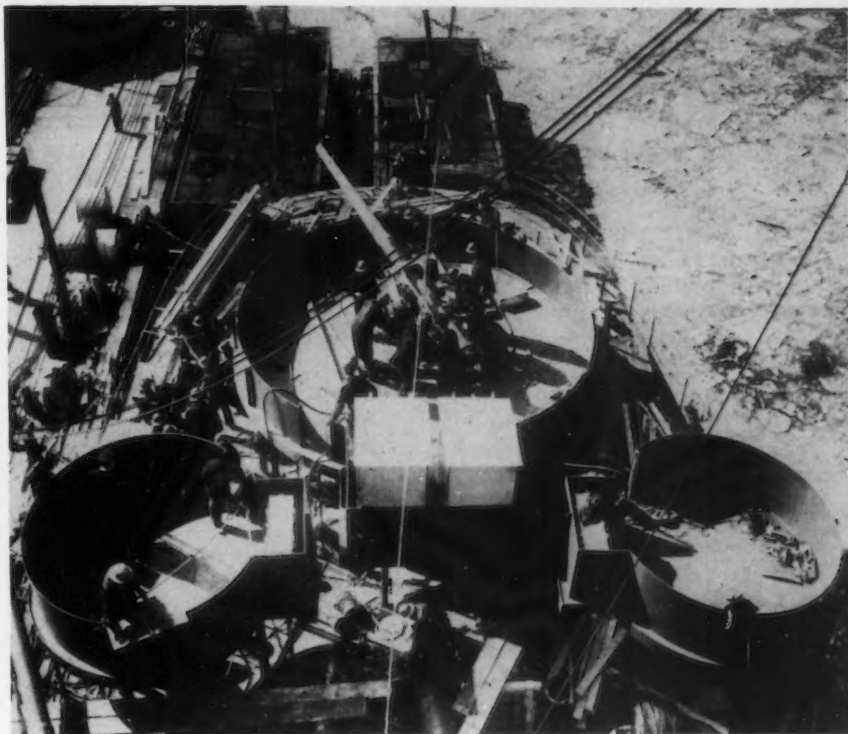
By T. C. CAMPBELL

... Unless the Iron and Steel branch of the War Production Board is able to effect some kind of overall coordination between its various steel product divisions soon, situations may arise in the steel industry which will retard production of urgently needed materials.

Accent for several months has been entirely on finished steel products such as plates, shapes, bars, sheets, etc., with not enough attention having been paid to total available steel ingots and primary steel equipment. In addition to these factors it has only been recently that some attempt has been made to ascertain an estimate of steel shipments by various priority levels. Even today such statistics in Washington are still incomplete and do not give a clear overall picture of the tremendous rated backlog, as well as even current shipments on steel mill books.

Allocations, priority ratings, directive orders, etc., have in almost all instances been granted or authorized without a clear cut picture of whether or not such production would run head-on with just as urgently needed material on which similar authorizations had been granted in previous weeks or months. It is not believed that such conditions are favored any more by the WPB than by the steel industry, yet they exist and have had and will continue to have a possible retarding effect on maximum efficiency of operation and distribution.

A study of the situation based on steel mill experience and distribution seems to indicate that one troublesome factor is the competition between various steel product divisions at WPB. Those entrusted with the problem of obtaining maximum production of plates at Washington are little concerned with the urgency or the production of shell steel, structural shapes, rails, or tin plate. Yet on the other hand iron and steel branch experts who exercise control over the distribution of these latter products, have the same idea in mind, namely, all the shell steel possible, all the sheets possible, etc. Under the present



AP Photo

STINGERS FOR THE MERCHANTMEN: Final tests are being made on this heavy deck gun on a merchant vessel in an American shipyard as other workers prepare elevated machine gun nests to take lighter guns. These aids will help them stab their way through the sub-infested waters along the Atlantic coast.

tempo of production for the Army, Navy, Maritime Commission and lend-lease customers, it is not possible with available ingots to give any one product group all they want without definitely affecting the other products.

For the past several months emphasis has been placed on production of plates with the result that plate production has reached unprecedented levels with extreme pressure being applied for even greater output. At the same time, however, demands for shell steel, rails and structural shapes, as well as allocated sheet business, have been expanding at a terrific rate. While plate demand has been paramount from a publicity standpoint, those branches of the Army and Navy which are seeking shell steel and structural steels as well as sheets, feel that their requirements are just as important as plate demand.

Any steel scheduler "out in the mill" knows that only so much can be done with ingots and after the ingots have been properly distributed and scheduled only so much definite semi-finished steel can be made. Thus, if a hurry-up order comes in for pipe for Russia

or light gage sheets for other lend-lease customers, this takes a definite amount of semi-finished steel and may result in cutting down the amount of slabs available for plate tonnage or tin plate. On the other hand there are some finishing mills which, in addition to turning out shell steel, must use the same equipment for structurals and for rails. With WPB experts covering these three products, it is obvious that all three want the material at the same time. On the other hand, if the production of one item is out of balance with available blooms or slabs, something else must suffer.

A clear indication of why the distribution of steel in the upper brackets becomes an increasingly difficult job for the steel industry is found in statistics which indicate that for some companies, counting allocations and orders down to A-1-j, approximately 65 per cent or more of current shipments are falling in that class. Yet there are other companies and specific units in steel concerns whose schedules extend for weeks on nothing but allocations and A-1-a orders.

While Washington officials seem

to be aware of this situation, the competition among the various products in the higher brackets continues merrily along and if proper coordination is not affectuated between the demands of these various products, taking into account the difficult problem of fairly distributing available semi-finished material, strategic production is bound to be affected. The steel industry in such a case would find itself pretty much "on the spot" despite the fact that it has been told in no uncertain terms what order M-21 means and warned that allocations "go back to the ingot."

From a constructive standpoint, it has at various times been suggested that the WPB, in its iron and steel branch, have the benefit of technical steel schedulers from various companies whose daily job it is to visualize steel production from an overall standpoint. It is a matter of history that some of the pitfalls encountered by the WPB were discovered and solved long ago in various steel companies which were forced to make sure that one particular product "did not get all the gravy."

At the present time many steel companies maintain simple but comprehensive statistics which

tell within relatively few minutes or hours the exact position of the backlog, the current schedules, and the actual shipments, both as to product and to priority rating level. It would seem that such figures would be exceedingly helpful *before* and not after wholesale allocations and priority ratings have been authorized.

Old Land Grant Rates Seen Hurting Truckers

Detroit

• • • A rumble of criticism directed at the government methods of making shipments by rail even when highway transport would be more rapid has been heard in Detroit. The Army, it is claimed by the motor truck industry, requires shipments of virtually all Army contract material by rail because the Army has a very low rate (approximately 50 per cent of normal) for railway shipments as a hangover from the land grant days. The rail shipping practice is adhered to, even when the distances are minor and even when the material to be shipped consists of highway rolling stock. The trailer manufacturers are particularly vocal about this situation, citing examples of trailers which they have sought to deliver behind tractor-trucks, the regular trade practice, but which had to be put on rail cars despite congestion and delay due to extensive shipments of other war goods.

Sidney Machine Tool Output Lifted 275% By War

Sidney, Ohio

• • • Sidney Machine Tool Co. reports that it has increased its output approximately 275 per cent since the outbreak of war in 1939. Moreover, expansion now under way is expected to permit a further increase in output amounting to 40 per cent over present operating rate. The company reports that it is operating three 8-hr. shifts seven days a week, and that its employees now total 247, as against only 110 employed when the war broke out. The company has trained all of the men added to its working force in the past few years, and is now training workers to man the new facilities upon completion.



OEM Photo by Palmer

LIBERTY SHIPS: In the maze of cranes and structures, shown above, Liberty ships are being built at an ever increasing tempo, while below, workmen transfer designers' symbols for rivet holes, cuts, bevels, and other marks to the plates, making them look like huge Chinese laundry slips. At the yard, parts are prefabricated in a plant six miles away and shipped to the ways by flat car.



WB BRAKES, TOO, ARE *Designed* FOR CONVENIENCE



Rip-cord ring conveniently located for emergency use.

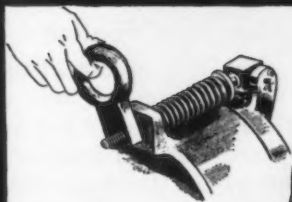
Compactly folded parachute carried in out-of-the-way position.

Parachutes provide utmost convenience for the airplane pilot—rip-cord ring easily accessible for emergency use—'chute in compact form, located out-of-the-way, frequently as seat or cushion for pilot.

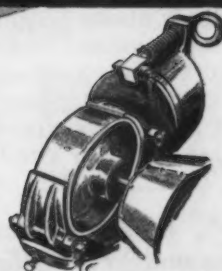
Likewise, EC&M Type WB Brakes provide convenience not for emergency operation but also for normal service. Manual release, a standard feature of these brakes, is valuable in making brake adjustments, replacing shoes, setting machinery—and, should power fail, it permits manual lowering of crane load.

Like the 'chute under the pilot, the connecting lever is below the brake wheel. An important feature, since it permits fast removal of motor-armature without dismantling the brake or disturbing any adjustments—makes shoe replacement easier, too.

Consider also, these other important features of the WB Brake: Liberal magnet design. Low contact-pressure per square inch. 50% of the wheel covered by brake shoes; 50% exposed to give heat radiation. Bulletin 1004-C gives complete details. Write for your copy.



Convenient hand release on top—a standard feature of all EC&M Type WB Brakes.



Out-of-the-way, like pilot's parachute, operating mechanism is below brake wheel.



THE ELECTRIC CONTROLLER & MFG. CO.

2700 E. 79th Street
CLEVELAND, OHIO

Predicts Steel Will Replace Brass in Cases

Cleveland

• • • Washington circles believe that steel cartridge cases will have entirely replaced brass cases by August of this year, or October at the latest, according to Dr. Bradley E. Stoughton, president of the American Society for Metals, in a speech here April 6 before the local chapter.

New officers of the Cleveland chapter inducted at the meeting included A. E. R. Peterka, executive engineer, Lamson & Sessions Co., new chairman; vice-chairman, Paul Johnson, Thompson Products, Inc., treasurer; Prof. Gerald M. Cover, Case School of Applied Science, and secretary, Waldemar Naujoks, Steel Improvement & Forge Co.

Oil Well Supply Ahead Of Schedule on Projectiles

Oil City, Pa.

• • • Oil Well Supply Co., a subsidiary of United States Steel Corp., has completed Army orders for 1,000,000 anti-aircraft projectiles 62 days ahead of schedule, according to B. F. Harris, president.

Speeding its production schedules, the company will continue the manufacture of these shells as well as numerous other items essential to the war effort.

Among other Army and Navy articles under production at Oil Well Supply plants are breech and firing mechanisms; tank rings; ship and airplane castings; diesel driven centrifugal pumps; housings for large Navy guns; and the machining of larger size shells.

16,566% Personnel Increase In Cleveland War Office

Cleveland

• • • The Cleveland War Ordnance office has increased its staff from 18 members to 3,000 within a year.

500 Steel Ore Cars Ordered

• • • Charles J. Hardy, president, American Car and Foundry Co., announced that an order had been received from the Duluth, Missabe & Iron Range Railway Co. for 500 75-ton steel ore cars.

March Steel Plate Shipments a Record

Washington

• • • Steel plate shipments in March set an all-time record of 878,726 tons, C. E. Adams, Chief of WPB's Iron and Steel Branch, announces. February shipments were 758,723 tons. Deliveries from strip mills totaled 306,195 tons in March, a substantial increase over February's total of 268,988 tons. Deliveries to shipyards for the Maritime Commission's merchant ship program increased 30 per cent in March over February. April deliveries are expected to equal the March total, despite the fact this month has one less working day.

C-I Chicago Plants Break 19 Records During March

Chicago

• • • Chicago area plants of Carnegie-Illinois Steel Corp. broke 19 of their monthly production records during the month of March. Twelve production records were broken at the South Chicago works, five at the Gary works, and two district records for production also fell.

The two district records broken were those for blast furnace production which was increased more than 10,000 tons over the best previous monthly record established in December, 1941, and the total production of steel ingots which was several thousand tons higher than the best previous record also established in December, 1941.

At the Carnegie-Illinois South Chicago works, blast furnace production was increased substantially over the previous record established in August, 1941, and production of open hearth ingots topped the record made in December, 1941. Other records broken were for total ingots, including those produced in electric furnaces. Four new rolling mill records also were established.

The foundry department also established a new record for the production of molds, stools and castings.

At Gary works two blast furnaces registered an increase over their previous top monthly production records established in 1941, and three new rolling mill records were established.

March Shipments by U. S. Steel 1,780,938 Tons

• • • Shipments of finished steel products by subsidiary companies of United States Steel Corp. for the month of March, 1942, were 1,780,938 net tons, compared with 1,616,587 net tons in the preceding month (February), and with 1,720,366 net tons in the corresponding month in March, 1941.

For the year 1942 to date, shipments were 5,136,418 net tons compared with 4,951,271 net tons in the comparable period of 1941, an increase of 185,147 net tons.

The shipments for March are the highest recorded for the month in the history of the Corporation. The first quarter total is the highest first quarter on record.

T.C.I. Vice President Gets Service Medal

Birmingham

• • • Among the 68 employees of Tennessee Coal, Iron & Railroad Co. who received United States Steel Corp. service medals during the first quarter of 1942 were Thomas Chalmers, vice-president in charge of operations, a 35-year medal; C. R. Culverhouse, assistant comptroller, a 35-year medal; LeRoy Holt, director of sales promotion, a 30-year medal, and A. Clinton Decker, sanitary engineer, a 30-year medal.

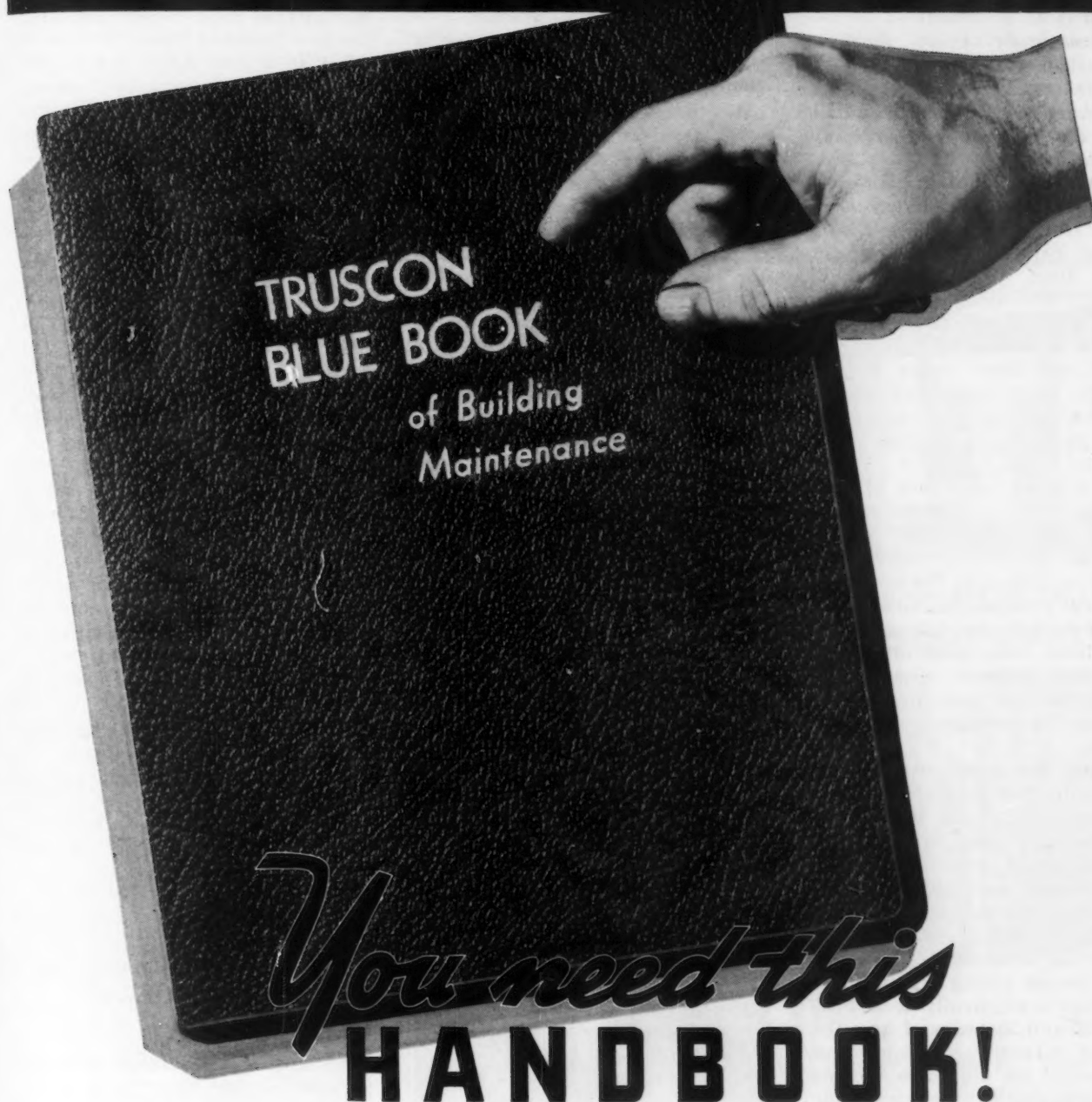
Steel Construction Institute Issues New Specification

• • • A tentative specification for the design, fabrication and erection of structural steel for buildings by arc and gas welding has been issued by the American Institute of Steel Construction. Copies may be obtained at 25c. each from the executive office of the Institute, 101 Park Avenue, New York.

National Forge & Ordnance Commemorates "E" Award

• • • The Navy has awarded the "E" pennant for excellence in production to the National Forge & Ordnance Co., in Irvine, Warren County, Pa. The company issued a brochure to commemorate the award.

MAINTENANCE EXECUTIVES



It simplifies your building maintenance problems. It tells you **HOW**—to harden cement floors—to rust-proof steel sash, tanks and structural work—to slip-proof floors and landings—to dust-proof cement floors and stairs—to acid-proof steel work—to protect and restore wood floors—to reduce sun glare—to waterproof new construction—and how to get efficient, economical solutions to many more maintenance problems.

FREE—to plant maintenance executives. Request must be written on business stationery to Dept. 1-24.

TRUSCON LABORATORIES

DETROIT • MICHIGAN

THE IRON AGE, April 16, 1942—91

Machine Tool Makers Aim at 168-Hr. Week

Chicago

• • • Practically every machine tool builder today is actively engaged in converting operations to a continuous basis, 24 hours a day, seven days a week, George H. Johnson, president of the National Machine Tool Builders Association, told the members at the opening session of the 40th spring meeting held at the Edgewater Beach Hotel, Chicago, April 13 and 14. "We must get and hold 168-hr. operation," he said, "despite the difficulties of building up second and third shifts to full strength and the almost impossible job of obtaining the supervisory personnel needed to cover three full shifts."

Mr. Johnson, president of Gisholt Machine Co., advocated subcontracting of work as a means of balancing production where output is now limited by the operation of a few critical machines. He also advocated the taking on of subcontract work from other machine tool builders where facilities cannot be used around the clock on the company's own production.

Among the other broad problems facing the industry that Mr. Johnson brought out were material shortages and shortages of men due to the Selective Service Act. Nickel has already been banned for castings and for steel used in the manufacture of machine tools. Because draft boards are no longer giving occupational deferment to physically fit men between 20 and 35 years of age, the industry is faced with training of men beyond the draft age and the wide employment of women. The speaker stated that in Canada as high as 60 per cent of machine operators are women. He called upon designers to make machines more automatic in function and less fatiguing to operate.

Mr. Johnson expressed the hope that the industry would be freed to a great extent of the burden of answering questionnaires, coming from all kinds of government agencies in great volume. "I think we might well ask them to stop making us fill out blanks and let us get down to the business of making machine tools," he said. Mr. Johnson did request, however, that the government ask the ma-

chine tool builders specifically about the critical materials they use and must have, particularly since machine tools will, probably soon be subject to allocation.

Tell Berna, general manager of the association, explained how the new priority form PD-25-a will have to be used to obtain materials after June 30. Heretofore, blanket ratings have been used on form P-11-a. From the data to be supplied on the new form, priorities will be assigned according to the priority rating of orders on the books—so many castings, for example, for machines bearing A-1-a priority ratings, so many for A-1-j ratings and so many for A-2 ratings, etc. By allocations of materials in this way, allocation of machine tools will be effected.

Mr. Berna indicated that on the basis of an order issued last week

by WPB, after a 90-day period of grace, steel companies would be forbidden to ship nickel steel to the machine tool builders. He suggested that high carbon steels or the new National Emergency steels (THE IRON AGE, April 9, p. 66-68) be substituted for nickel steels, although few steel companies are prepared to furnish these new grades at present.

Production of the implements of war is "up to expectation," according to William H. Harrison, director, production division, WPB, but we are pitifully short of many items like artillery and anti-aircraft weapons. A very good job has been done by the machine tool industry, he said, but he left it up to the conscience of each individual member of the group as to whether his plant was doing all that could possibly be done. Statistics to Mr. Harrison are only a part of the picture. "The fate of the next six critical months ahead rests in the heads, hearts and hands of the machine tool builders," Mr. Harrison said, but he expressed the conviction that when the record is written it will be one of which the industry will be proud.

Other off-the-record sessions were addressed by George C. Brainard, chief, and Howard C. Dunbar, assistant chief, tools branch of the WPB; also by Geoffrey W. Smith, counsel of the WPB.



British-Combine Photo

ETON AT WORK: Eton College is now running its own munition factory, and the boys, in striped pants and Eton jackets, are making parts for anti-tank guns in the shops of the school. Here two boys are at work with their schoolmaster, who is at the center lathe.

Excess Inventory Rumors Denied by Rear Admiral

Pittsburgh

• • • Answering rumors of large inventories at Navy and other ship yards, Rear Admiral A. E. Watson, commandant, Fourth Naval District, Philadelphia, said here this week while attending a Navy E pennant award for the New Kensington works of the Aluminum Co. of America, "There is no excess inventory of material in the Fourth Naval District. There are some cases where partially fabricated parts have piled up awaiting other material which has been delayed. We can always use all the material we can obtain."

Admiral Watson said all ship production was reaching new highs.

War Department Lists Awards and Intentions

•••The War Department announced on April 11:

1. Award of contracts to M. E. Trapp, and others, of Oklahoma City, to James S. Taylor Construction Co. and Thomas S. Byrne, both of Fort Worth, and to Central Construction Co., Dallas, for construction of a cantonment at Camp Hood, Killeen, Tex. Construction will cost in excess of \$5,000,000 and will be supervised by the San Antonio District Office of the Corps of Engineers.

2. Authorization for construction of an Air Force school at Hobbs, N. M., to cost in excess of \$5,000,000. Construction will be supervised by the Albuquerque District Office of the Corps of Engineers.

3. Award of a contract to Chemical Construction Co., New York City, for architect-engineer-management services, procurement of production equipment, training of key personnel and operation in connection with a manufacturing plant in Texas. Construction will cost in excess of \$5,000,000 and will be supervised by the Denison, Texas, District Office of the Corps of Engineers.

4. Authorization for construction of a new manufacturing plant in Indiana to cost in excess of \$5,000,000. In connection with this plant a letter of intent has been negotiated with Russ & Harrison, 1001 Architects Building, Indianapolis; Leslie Colvin, 507 Board of Trade Building, Indianapolis; William E. Mohler Co., 714 Union Title Building, Indianapolis, in preparation for a contract for architect-engineer-management services. Construction will be of temporary type and will be under the supervision of the Louisville District Office of the Corps of Engineers.

5. Authorization for construction of a new manufacturing plant in Indiana to cost in excess of \$5,000,000. In connection with this plant a letter of intent has been negotiated with A. S. Alschuler and R. N. Friedman, 28 East Jackson Boulevard, Chicago; Marsch-Peterson-Walker, 1307 Wrightwood, Chicago; J. W. Snyder Co., 307 North Michigan Boulevard, Chicago, in preparation for a contract for architect-engineer-management services. Construction will be of temporary type and will be under the supervision of the Chicago District Office of the Corps of Engineers.

6. Negotiation of a letter of intent with William S. Lozier, 10 Gibbs St., Rochester, N. Y., and Broderick and Gordon, Denver, in preparation for an architect-engineer-management contract in connection with a manufacturing plant in Kansas. Construction will cost in excess of \$5,000,000 and will be supervised by the Kansas City District Office of the Corps of Engineers.

7. Award of a contract to Widmeyer Engineering Co., St. Louis, for architect-engineer services incident to construction of an Air Force school at Blytheville, Ark. Construction will cost in excess of \$5,000,000 and will be supervised by the Memphis District Office of the Corps of Engineers.

Book on Gages Prepared By Sheffield Corp.

•••To meet the need for new technical literature throughout plants, engineering schools, and defense classes, the Sheffield Corp., Dayton, Ohio, has published a textbook on the use of gages in modern industry entitled, "Dimensional Control." The book has 64 pages and 82 illustrations. It sells for \$1.50.

The book reviews the history of

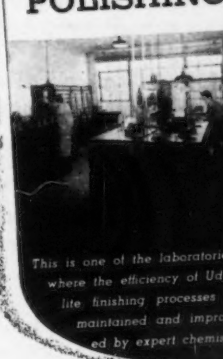
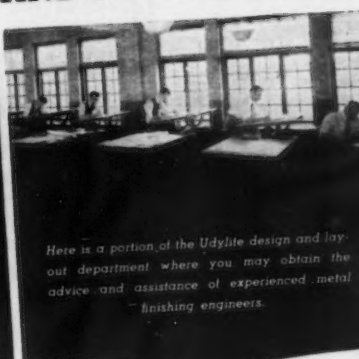
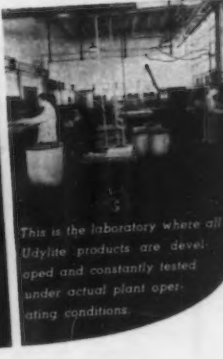
standards in gaging and an explanation is given on the basic reasons for precision manufacturing, the fundamentals of gaging practices, size comparisons and types of gages.

Such topics as wear allowances, gage finish, bilateral and unilateral tolerances and fits are discussed. The theory and practical use of go and not go gages and gage blocks are illustrated. There is a comprehensive explanation of

selective assembly and interchangeability. The applications and operations of various gages, such as comparators, internal instruments and external checking instruments are clearly explained. The book closes with tables of fits and tolerances. There is also an insert giving wear allowances and gagemaker's tolerances for plain plug and plain ring inspection gages and for flush pin and adjustable snap gages.

UDYLITE

HEADQUARTERS FOR ELECTROPLATING, POLISHING AND ANODIZING INFORMATION

This is one of the laboratories where the efficiency of Udy-lite finishing processes is maintained and improved by expert chemists.

Here is a portion of the Udy-lite design and layout department where you may obtain the advice and assistance of experienced metal finishing engineers.

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For prompt, dependable metal finishing information, call on Udylite. No organization is better equipped to give you information gained from installing plating, polishing and anodizing departments in many leading manufacturing plants throughout the country. • Trained plating engineers and electrochemists are at your service. These men know metal finishing and they can help you plan a new installation or revise your present one for

greater efficiency. They know, also, that you want information quickly. • Udylite has a complete line of equipment . . . second to none in terms of quality and efficient performance. • and supplies . . . for every metal finishing need. Salts, acids, anodes, buffing and polishing materials—everything required. • Call Udylite for prompt service on your finishing requirements. You pay no more for Udylite dependability.

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Are You a Match for a German or a Jap?

Members of our Armed Forces must be, or we will lose the war.

But are you, as a member of the Civilian Army, doing as much to win this war as a German or a Japanese in a similar position is expected to do?

If you and millions of others in the Civilian Army are not exerting your full strength and ingenuity, our boys at the front will not get the support they need to win.

Many Americans are wondering what they can do to help.

Every reader of this publication knows the importance of accumulating and salvaging waste materials — iron, steel and non-ferrous metals in particular.

Help in this important war work in your plant, your home and your community.

More scrap will build more ships, more planes, more guns, more of everything needed to win this war—and win it more quickly.

We shall be glad to tell you how you can help.

The CHARLES DREIFUS Company

(Brokers in Iron and Steel Scrap for 40 years)

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NEWS OF INDUSTRY

Should Work 54-60 Hr. Week, Engineers Told

Cleveland

• • • "Any man who is not putting in 54-60 hours a week is not doing a job," Charles W. Scheihing, chairman, told members of the Cleveland Chapter of the American Society of Tool Engineers at their April 10 meeting.

Republic Operations Above 100%, Wysor Says

Jersey City, N. J.

• • • At the annual meeting of the stockholders of Republic Steel Corp., on April 8, R. J. Wysor, president, discussed the war time operations of the corporation and production of its various units. Operations during the initial quarter of this year were over 100 per cent of capacity, and production records of various departments are being broken monthly. Furthermore, since 1938 the steel ingot capacity of the corporation has been increased by 1,500,000 tons.

During March, new all-time highs in iron and steel output were reached, exceeding previous records set in March and October, 1941. Plate production was four times greater than two years ago, and efforts are being made to convert more sheet and strip mill capacity to plate manufacture.

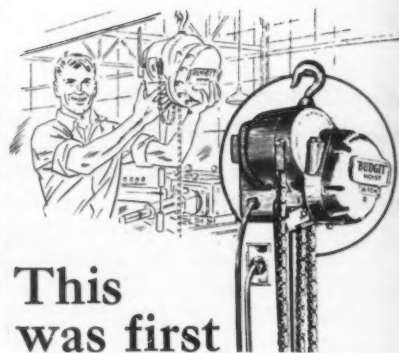
Electric furnace output reached a new peak in March, and capacity is again being expanded, Mr. Wysor said. New facilities are going into operation as quickly as possible, and include: a blast furnace to be in blast within 60 days, added cold drawing and plate mill facilities, and new electrolytic tinning equipment.

Metallurgical research on materials to substitute for scarce alloys is being expanded as rapidly as possible. The growing scarcity of some materials makes this program vitally important to the job of keeping the fighting forces well armed.

Warehouse Men to Convene

Cleveland

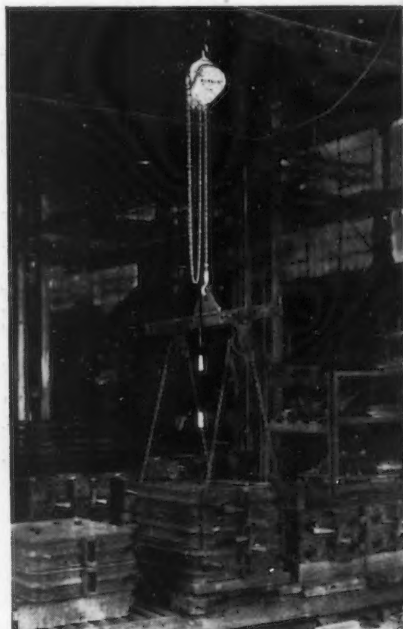
• • • The American Steel Warehouse Association will hold its annual convention at the Drake Hotel, Chicago, on May 12 and 13.



And still is! 'Budgit' Hoists were the first light-weight electric hoists developed to avoid manual lifting and to take their places as vital units in production.

They still hold this premier position and now serve in hundreds of defense industries and thousands of installations.

'Budgit' Hoists are portable, electric hoists with lifting capacities of 250, 500, 1000 and 2000 lbs. They are priced from \$119 up. For complete information, write for Bulletin 348.



Send for catalog containing complete information on Hoists, also, "Time Saving Calculator" that shows savings they earn.



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Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load-Lifter' Hoists and other lifting specialties. Makers of Ashcroft Gauges, Hancock Valves. Consolidated Safety and Relief Valves and 'American' industrial instruments.

NEWS OF INDUSTRY

Blast Furnace, Coke Ovens Going Up at Lackawanna

Buffalo

• • • Construction has begun on a new blast furnace and battery of 76 coke ovens at the Lackawanna plant of the Bethlehem Steel Co. Both new units are expected to be completed this year. The company added a new furnace and the same number of coke ovens at the Lackawanna plant last year.

COMING EVENTS

April 14 to 17—Packaging Exposition and Conference, Hotel Astor, New York.

April 15 to 17—Open Hearth Conference, Cincinnati.

April 15 to 18—The Electrochemical Society, spring convention, Nashville, Tenn.

April 18 to 24—Foundry and Allied Industries Show, Cleveland.

April 20 and 21—American Zinc Institute, 24th annual meeting, Chase Hotel, St. Louis.

April 20 to 23—American Chemical Society, Municipal Auditorium, Memphis, Tenn.

April 20 to 24—American Foundrymen's Association, Cleveland.

April 27 to May 1—American Mining Congress, Coal Show, Cincinnati.

May 4 to 6—Triple Mill Supply: Southern Supply & Machinery Distributors Association, National Supply & Machinery Distributors and American Supply & Machinery Manufacturers, Hotel Traymore, Atlantic City, N. J.

May 11 to 13—American Gear Manufacturers Association, 26th annual convention, Hershey, Pa.

May 19 and 20—National Metal Trades Association, 44th annual convention, Biltmore Hotel, New York.

May 25 to 28—National Association of Purchasing Agents Convention, Waldorf-Astoria Hotel, New York.

June 21 to 25—American Water Works Association, Chicago.

Aug. 23 to 30—National Association of Power Engineers, New Orleans.

Sept. 1 to 11—Building and Construction Trades Council, Atlantic City, N. J.

Sept. 22 to 24—Association of Iron & Steel Engineers convention, Pittsburgh. Iron and steel exhibit suspended this year.

Oct. 5 to 9—National Safety Congress Association, International convention, Baltimore.

Oct. 12 to 16—National Metal Congress and Exposition, Detroit.

Nov. 30 to Dec. 5—National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

COURTESY THE TRAILER COMPANY OF AMERICA



How to move more war materials faster is one of the crucial problems of this war. In fact many military men say the vital conflict centers on transportation—more so than during any other war in our history.

Pictured here is one contribution to faster hauling. Truck-trailers made of corrugated ARMCO High Tensile Steel are lighter and carry bigger loads. They are used in transporting war products to various key assembly plants and for carrying supplies to the Army's front-line battlefields.

When used as beams, corrugated ARMCO High Tensile Steel sheets make it possible in many cases to

build sections with only 50 to 65 per cent of the weight of conventional types of construction. Even more weight-saving is possible when similar sections are used as columns.

In the shop ARMCO High Tensile is easy to fabricate. It is much stronger and tougher than mild steel; yet there is comparatively little difference in requirements for cold forming.

Could you use this extra strong steel for your war products? We'll be glad to send you complete fabricating information on ARMCO High Tensile. Just address the American Rolling Mill Company, 1511 Curtis Street, Middletown, O.

TO KEY MEN: Ask us for Sheet Metal
Working Data on War Products and Post-War Products



Rulings Made on Six Pleas For Resale Steel Price Relief

••• Six orders replying to trade petitions for exception or amendment of Revised Price Schedule No. 49 (Resale of Iron or Steel Products) were issued last Saturday. Two requests were denied, one dismissed, two granted and

one partially granted under the terms of the various orders. Summaries of the orders follow:

Order No. 1. Jacobs & Gile, Inc., Portland, Oregon, was denied a petition requesting that its price on a particular gage of galvanized sheet be raised \$5 per ton. The request was based on the statement that the price in effect on April 16, 1941 (the base date determining

maximum prices on resales of iron and steel products) was competitive and was lower by \$5 than the comparable price on other gages. OPA held the argument invalid and said there is no reason to raise the price on one gage to allow a margin exactly comparable to other gages. An additional argument based on increased freight costs was held invalid since Amendment No. 2 to the price schedule allows the addition of reasonable rail differentials in the Pacific Coast region.

Order No. 2. A petition for amendment filed by H. Schultz & Sons, Newark, N. J., was dismissed. The request for permission to raise prices on merchant wire products has already been granted through provisions of Amendment No. 2.

Order No. 3. The American Near East Corp., New York City, was granted partial exception to the schedule on sales and deliveries of specified kinds, grades and quantities of steel to designated buyers in the Near East. This firm said the expenses for maintenance of its foreign branch offices were such as to make inadequate the permissible 10 per cent margin on export sales. The petitioner is allowed to add an extra margin only by the amount that will bring its gross margin for the home office approximately equal to that allowed other export merchants.

Order No. 4. Trans-Atlantic Export Corp., New York City, was denied a request for an addition to the margin permitted it as an exporter in order to compensate an agent in South Africa who participated in the transaction.

Order No. 5. Simons Iron & Metal Co., Newark, N. J., was granted a petition permitting it to sell specified kinds, grades and quantities of steel products at prices approximating the cost of these items. This company had bought large quantities of steel at high costs prior to Dec. 15, 1941. On most of this steel it had incurred a large scrap loss.

Order No. 6. A partial exception was granted to American Steel Export Co., New York City, permitting it to sell a specified inventory of iron and steel products for export at cost. OPA found the company would suffer substantial losses if its inventory, acquired prior to Dec. 15, 1941, at high prices, were sold at ceiling prices. No export commissions or other fees are to be added by the company.



Gear, Pinion Reports

Washington

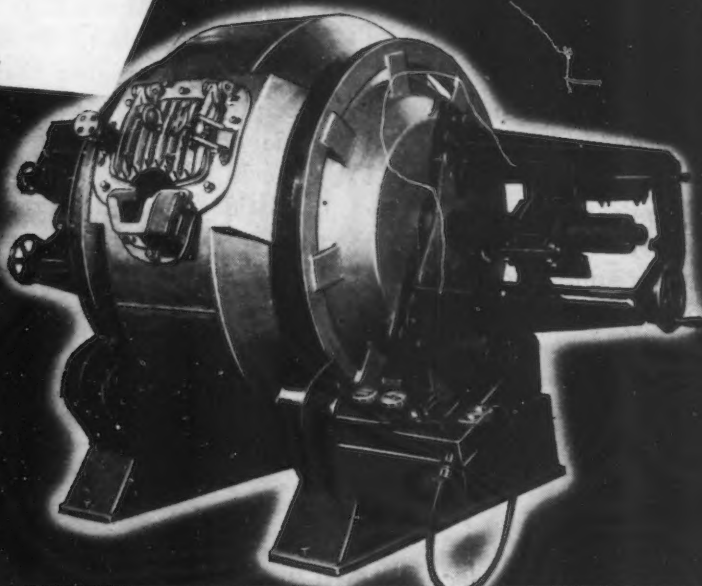
••• Manufacturers of gears, pinions, sprockets or speed reducers whose gross sales of such items during 1941 were less than \$5,000 are exempted from submitting monthly reports to OPA as originally required under Price Schedule No. 105.

Scope of the schedule is clarified in the new amendment by specific definition of the term "sale" as applied to these products. "Sale" includes sales or exchanges or other transfers and also includes the machining of materials furnished by the customer into the form of gears, pinions, sprockets and speed reducers.

In the gear business, OPA explained, customers frequently furnish the gear manufacturer with steel or other material to be cut or otherwise processed. It never was intended that such service transactions should be exempt from the schedule's provisions. The term "sale," however, ordinarily carries with it implication that title to the product shifts from seller to buyer. In this service transac-

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PRICES

tion, however, no such transfer of title occurs. Therefore, "sale" is defined as including the service transaction.

Originally, OPA classified items in three categories: standard, recurring specials and special. Standard items are defined as those in price lists in effect Oct. 15, 1941.

Recurring specials originally were defined as any item for which two orders have been or may be received subsequent to Feb. 18, 1941, and of which \$1,000 worth of 500 items have been sold since that date. When a recurring special is first sold under the schedule that sale is to be reported on Form 205:1 or 205:2 and the price charged on that sale then becomes the maximum price for all subsequent orders, subject to certain specified variations. To simplify the task of identifying "recurring specials" for reporting purposes, an alternative definition is provided in the new amendment so that manufacturers may check back through customer records.

In another new provision, the manufacturer also is afforded the privilege of reporting the sale of any "special" item on Form 205:1 or 205:2.



Aids Machine Tool Makers

••• OPA last week issued Amendment No. 6 to Revised Price Schedule No. 67 (New Machine Tools), authorizing an increase from \$7,025 to \$7,290 each, or slightly less than 3.8 per cent in the price of 150 Model No. 26 Hydrolap Machines in order that the Norton Co., Worcester, Mass., can arrange to sub-contract for the immediate production of these machines. Military demand, plus the fact that the Norton Co. and the Dennison Mfg. Co., chief producers of the machines, are unable to increase production are the reasons OPA permitted Norton to recover additional costs.

The amendment requires Norton to file with OPA the name and address of each sub-contractor undertaking to produce the additional machines; the serial number of each machine, and a statement of sums expended for new patterns, jigs, fixtures and tools.

OPA amended the maximum price schedule on machine tools to permit the Defiance Machine

Works, of Defiance, Ohio, to sell certain machines built by its sub-contractor, the Power Gates Co., of Louisville, Kentucky, at increased prices, including one model at maximum price of \$1,600 each; and another model at maximum price of \$2,062 each.



Reusable Iron and Steel

••• Maximum delivered prices for reusable iron and steel prod-

ucts of certain types are covered under Revised Maximum Price Schedule No. 49, according to an interpretation designed specifically to clarify the distinction between reusable and scrap material. It was explained that prices of all reusable iron and steel products not covered by other specific schedules "after such shearing, cutting, straightening, bending or pickling as may be necessary, shall be computed in the same manner used by the seller on April

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Name _____

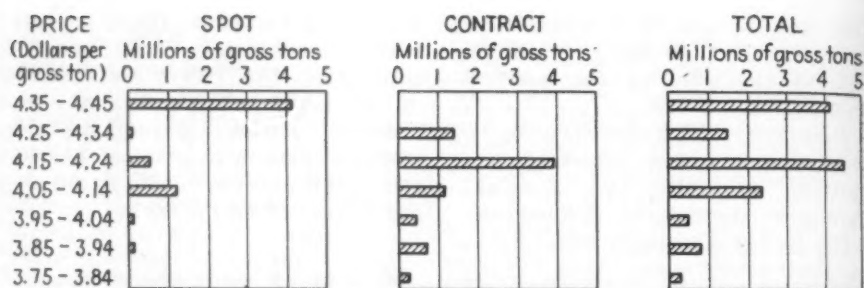
Address _____

City _____

PRICES

16, 1941, provided that such prices do not exceed the maximum delivered prices for comparable iron or steel products of prime quality."

"Unless this material is offered by the seller in such condition that no further operations are necessary to class it as similar to iron or steel products of prime quality," the OPA Administrator cautioned, "it cannot be classed as used and reusable, but instead



SPREAD OF PRICE FOR BASE ORE: OPA last week issued the charts above and upon next page, in connection with iron ore prices. Above are prices at which ore moved in 1941 season (seven large sellers).

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must be classed as scrap. Plates with rivet holes, for example, are not comparable of prime quality covered under Price Schedule No. 49 unless the punching of such rivet holes specifically was ordered by the purchaser. Otherwise the edge containing the rivet holes must be removed by shearing before plate is considered comparable. Where the purchaser has to absorb a preparation charge and scrap loss of such nature, the material cannot be sold at higher than scrap ceiling prices."



Action on Coke Schedule

Washington

• • • Showing that costs are above the oven net realization or that the oven net realization is insufficient for continued production a fixed ceiling price must be made by coke producers who seek relief from OPA's maximum prices. These conditions which must be shown before modification can be requested are provided for in identical amendments to Revised Price Schedules Nos. 27 and 77. The former covers by-product foundry and by-product blast furnace coke and the latter covers beehive furnace coke produced in Pennsylvania.

Specifically a producer seeking modification or adjustment must be prepared to show:

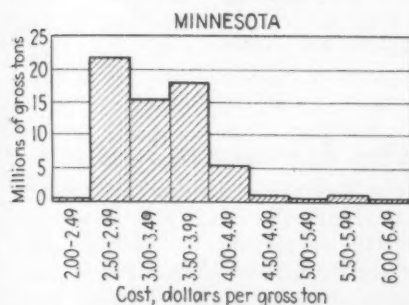
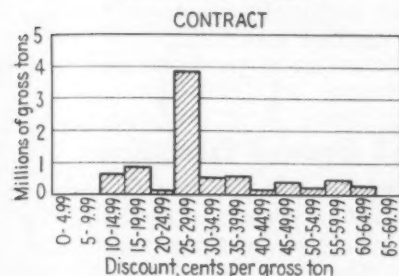
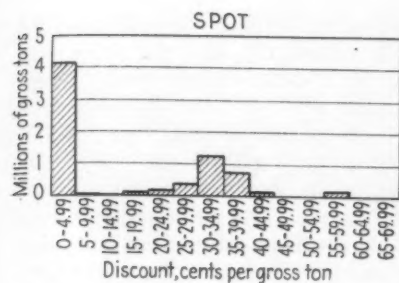
That costs of production are above oven net realization at the ceiling prices, or

That oven net realization is inadequate for continued operations at maximum prices in view of its high operating costs.

OPA said petitioners should submit all relevant data. In addition, OPA may require full data on costs and profits.

The amendment to Schedule 29

PRICES



QUANTITIES OF ORE SOLD: By seven large sellers of merchant ore in 1941 season, by discounts granted, are shown in two top charts above. Off-grade and intercompany sales, and premium ores are excluded. Lower chart shows quantities produced by cost of production in 1941 season.

also sets a ceiling delivered price of \$9 per ton on by-product coke produced and delivered within the switching district of Holt, Ala.

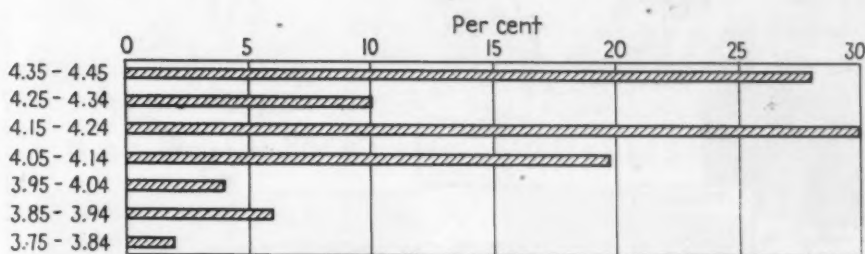
Electrical Appliances

••• Under the temporary maximum price regulation recently issued for domestic electrical appliances, sellers may continue to pass on the Federal manufacturers' excise tax. This point was set forth in Amendment No. 1 to Temporary Maximum Price Regulation No. 18.

Vessel Rate Rise Delayed

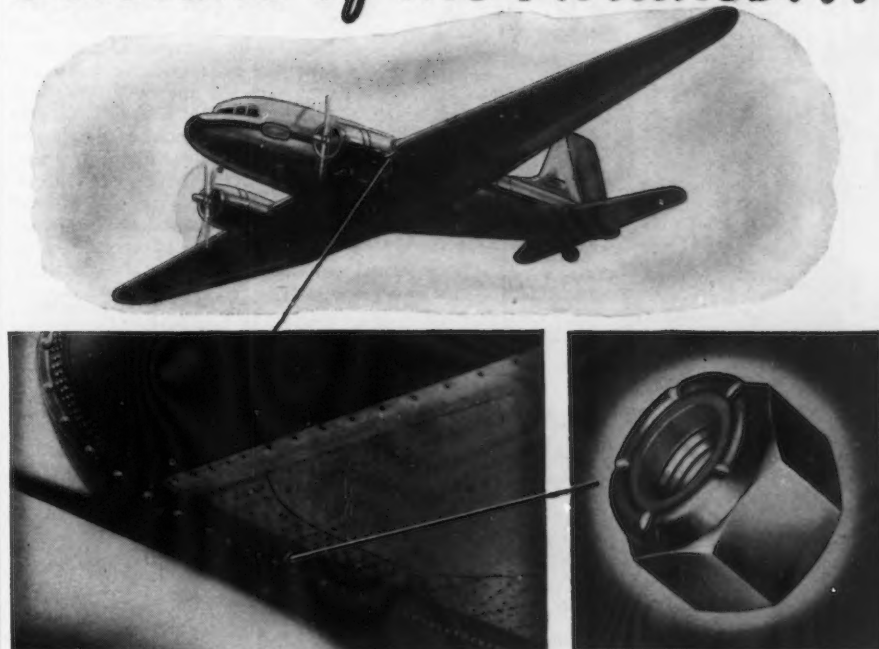
Buffalo

••• A proposed 3-cent increase per ton in the Great Lakes ore-carrying rate from Duluth and Superior to lower lake ports by



APPROXIMATE PERCENTAGES OF MERCHANT ORE SOLD: At various prices during 1941 season by seven large sellers are shown in this chart, released last week by OPA in connection with the establishment of a formal ceiling on iron ore prices.

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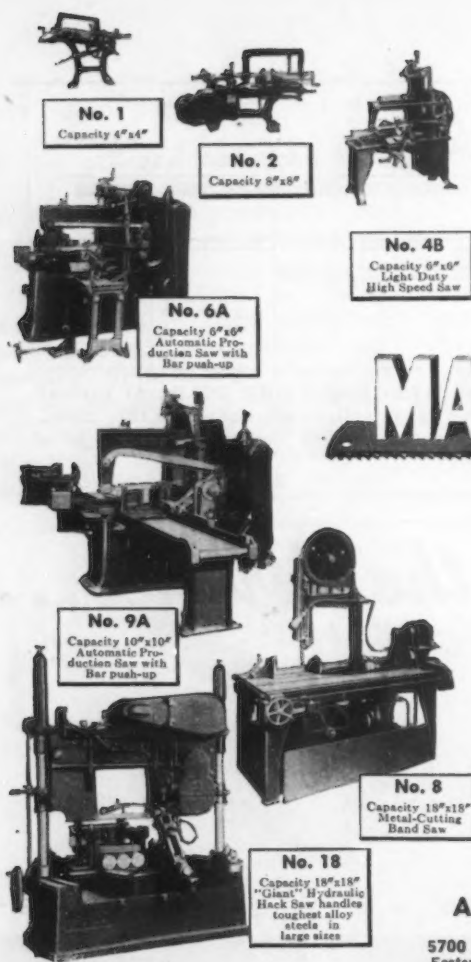
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two steamship companies here has been called off, at least temporarily, by a Government order freezing the price of Lake Superior iron ore at approximately last year's levels, executives of the two steamship companies announced this week. The ore-carrying rate of the Buffalo companies had been raised to 80 cents a ton after similar action by another company in another city.

G-E Granted Exceptions

••• General Electric Co. is permitted exceptions to Revised Price Schedule 82 covering wire, cable, etc. The exceptions cover "Formex Magnet Wire," and several "Flamenol" items.

Rated Refrigerator Sales

••• Maximum prices at which manufacturers may sell new domestic refrigerators directly to persons assigned a preference rating of A-10 or higher by the War Production Board are established in Amendment No. 1 to Revised Price Schedule No. 102. OPA has taken into consideration costs of storing, handling, financing and insuring incurred by the manufacturers when the WPB order prevented shipments. The base price established in the amendment is the same as the base price to distributors fixed in the schedule, but to this the manufacturer may add the actual amount of the excise tax, and the actual charges for servicing when special services are requested by the purchaser.

Vacuum Cleaner Schedule

••• An amendment making it plain that the amount of excise and sales taxes may be added to retail ceiling prices listed in Maximum Price Regulation No. 111, New Household Vacuum Cleaners and Attachments, was issued April 11.

Zinc Oxide Session

••• Zinc oxide dealers and exporters will meet Friday, April 17,

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PRICES

with OPA officials to discuss dealer and exporter margins, and sales of oxides in small quantities. Some 65 firms have been invited to attend the meeting, which will be held at 1:45 p.m. in the main auditorium of the Chanin Building, New York.



Rail For Structural Uses

• • • The maximum price for used rail sold for structural purposes, counterweights, fence posts and the like is governed by the price schedule for iron and steel scrap rather than the schedule for relaying rail, OPA has ruled.

The announcement was contained in an interpretation of three sections of the relaying rail schedule. A second point affected the maximum price for relaying rail originating from sources other than Class 1 railroads or Class 1 switching and terminal companies. Price Schedule 46 directs that the maximum price on this type of rail shall be \$30 per gross ton "minus the lowest railroad freight charge for transporting such rail from the shipping point to the basing point nearest freightwise to the shipping point." The question had arisen whether the "lowest railroad freight charge" to be used in determining the maximum price is the freight rate for relaying rail or some other freight rate such as for scrap. OPA has ruled that the freight rate for relaying rail must apply.

In the third point, OPA held that the price schedule for relaying rails applies to shipments from the continental United States.

Elevator Advisory Group Organized By WPB

Washington

• • • The WPB Bureau of Industry Advisory Committees on April 8 announced the formation of the Elevator, Escalator and Dumbwaiter Industry Advisory Committee. Committee members are:

C. F. Carlson, president, Monarch Elevator & Machine Co., Greensboro, N. C.; J. E. Martin, Montgomery Elevator Co., Moline, Ill.; L. A. Peterson, vice-president, Otis Elevator Co., New York; Stanley Rowe, Shepard Elevator Co., Cincinnati, Ohio; J. G. Gosney, vice-president, Westbrook Elevator Mfg. Co., Inc., Danville, Va.; G. L. McKesson, president, Haughton Elevator Co., Toledo, Ohio; F. E. Brust, vice-president, Atlantic Elevator Co., Philadelphia.

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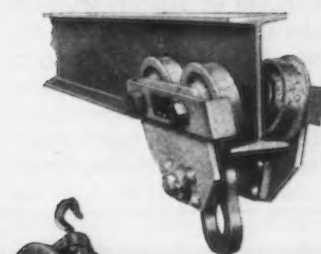
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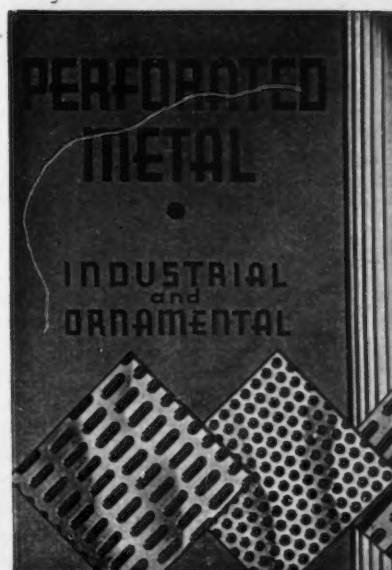
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WPB Puts Limit on Farm Machine Sales

Washington

• • • Farm machinery may not be sold, and exports of machinery in excess of the quantities permitted to be manufactured can no longer be made, according to an interpretive amendment to L-26 issued by WPB on Tuesday. The sales restriction does not apply to equip-

ment or attachments and repair parts which were completed, manufactured, or fabricated and ready for shipment in knock-down form on Oct. 31, 1941.

WPB said that some confusion of the order's terms has developed and issuance of the amendment was necessary to prevent production and sales over quotas and preserve the competitive status of various manufacturers and to con-

serve raw materials and finished products.



Shipments Permitted

Washington

• • • Steel companies melting National Emergency alloy steels are given authority until July 31 to ship specimens to laboratories or manufacturers without regard to preference ratings, WPB said on Tuesday. The purpose of the priority relaxation is to obtain the widest possible testing of the steel alloys which are made with a minimum of critical metals. The principle which is supposed to make these NE steels satisfactory is that "small quantities of various elements are more effective than large quantities of the single element," WPB explained.

Those companies receiving NE steels must certify in their purchase orders that the material will be used for experimental purposes; that the amount ordered together with any on hand or on order from other mills will not exceed 500 lb. for any one specification and that the total on hand or orders for all types does not exceed 10 tons.



Mining Machinery

Washington

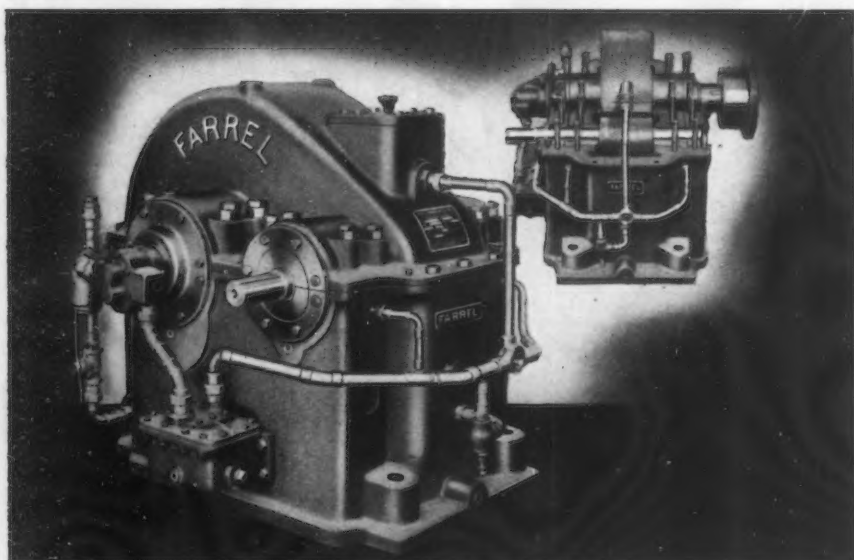
• • • Issued on Monday WPB amendments to Preference Rating Order P-56-a permit manufacturers of mining machinery and equipment to make deliveries to South American copper companies operating under Preference Rating Order P-58, to iron and steel producers under P-68 and to smelters under P-73.



Wyckoff Plants Break Production Records

Pittsburgh

• • • Both the Ambridge and Chicago plants of Wyckoff Drawn Steel Co., according to J. T. Somers, president, have broken all production records for the third successive month since its award in January of the Navy "E" Pennant and Bureau of Ordnance Flag for outstanding production.



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Catalog 438 gives complete descriptions and specifications of Farrel speed reducing and speed increasing units.

Farrel Type SI Gear Units are designed for operation at high speeds—service in which the pinion shaft may turn at 6,000 RPM, or faster—or the pitch line velocity of the gears may be as high as 12,000 feet per minute.

These extremely high speeds present problems of design and construction which can be answered only by specialized engineering skill, manufacturing facilities and experience. Hundreds of installations in varying types of service have proved Farrel Type SI Units to be outstanding examples of gear engineering and precision workmanship. They are smooth, quiet and efficient in operation, rugged and reliable under exacting conditions of continuous 24-hour duty.

A standard series of units with center distances of 6½" to 42", taking gears with face widths of 6" to 14", provide thirty sizes with capacities up to 3,000 HP. The speed ratio range is from approximately 1:1 to 16:1. We can also supply special units having two sets of gears with a ratio range from 12:1 to 60:1.



FARREL-BIRMINGHAM COMPANY, Inc.

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The Gear with a Backbone

Steel Priority Orders Under Close Control

••• In order to have a complete check on priority steel orders to such an extent that the entry, production, and shipment of rated orders will be under constant supervision, many steel companies have set up specific departments whose duty it is to follow through from start to finish on all incoming business.

One large company, with a chief priority official, first scans all orders to see that they represent war effort, that the priorities are properly applied, and that the extension procedure is correct. This is checked at three sources: The district office; the product manager's office; and finally the general office, after which time the order is approved for entry.

All records in the entire steel company dealing with a specific customer and order are plainly marked with the priority rating, such records including mill order sheets, steel provider sheet, steel works record, rollers order, shearman's order, and shipping papers.

This company has also established a comprehensive statistical record system which can tell in a short time the exact percentage by products and by mills of the various priority rating levels. This information can be obtained readily on total backlogs, current production, and current shipments.

Iron Users Must File PD-69 and PD-25-a

••• Pig iron users assigned a priority rating on form PD-25-a under the Production Requirements Plan must continue to file form PD-69 when ordering iron. Form PD-69 is required under the terms of the pig iron allocation order M-17.

Form PD-25-a is essentially an official approval of the purchase of a specified tonnage of iron; it does guarantee that the buyer will receive the iron. Whether or not a user obtains the iron will depend on whether WPB allocates the metal to him on the monthly schedule sent to all iron producers. In brief, even if you have a rating for iron assigned on a PD-25-a form, you must continue to file PD-69 when placing the order.

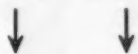
Gear Sales Set New Record in March

••• Sales of industrial gears in March rose to a new high, the American Gear Manufacturers Association reports. The index of sales compiled by the association rose to 455 in March from 353 in February, a gain of 28.8 per cent. This compares with 288 in March, and 299 in June, 1941, the latter being the 1941 high point. Sales for the first three months of the current year averaged 35.5 per cent above the comparable period of 1941. The index does not cover automotive or high speed turbine drive gears.

WPB Accusation a Complete Surprise, H. W. Hoover Says

Canton, Ohio

••• WPB's order prohibiting the Hoover Co. from fabricating or dealing in aluminum for 90 days because of alleged priority violations "came as a complete surprise," said H. W. Hoover, president. He added, "We were under the impression the whole priorities situation had been settled and adjusted three months ago. The company now has 83 per cent of its capacity employed on war work, chiefly in making shell fuzes. We have not used a pound of aluminum in an electric cleaner for three months. The government charge that we diverted aluminum to making motor bases has no basis in fact. We have converted some aluminum into the making of meter boxes . . . for an outside company with aluminum for which it had a priority rating."



Deliveries to Talon Banned

Washington

••• Denial of WPB charges that it had taken advantage of priority ratings to secure copper has been made by the Talon Co., Meadville, Pa., a zipper manufacturer. In a statement, in which it said it represents charges of lack of cooperation, the company declared that it has never acquired or used a single pound of copper "contrary to priority rules or regulations," that it had disclosed all pertinent facts to WPB and that it had "interpreted every order of WPB against our own interests where any doubt existed in our minds."

Steel Plants Get New Priority Aid

Washington

••• WPB on Monday granted a rating of A-1-c to 30 per cent of the dollar value of repair and maintenance materials and operating supplies ordered in any one quarter and an A-3 rating to the remaining 70 per cent by amendment No. 3 to preference rating order P-68, iron and steel maintenance and repair. Ratings are extendable by endorsement to supplier.

Producers are required to file monthly reports on form PD-228 with WPB showing applications of the A-1-c rating. A producer in order to apply the rating assigned by the order must communicate with the WPB Iron and Steel Branch describing the material.

The ratings are applicable to maintenance material and operating supplies and for property and equipment used in and essential to the production of any one or more of these materials or products: Pig iron and ferro-alloys; ingots; blooms, including forged; billets, including forged; slabs, including forged; tube rounds and sheet and tin bars; structural shapes; piling; plates, universal and sheared; rails; tie plates; track spikes; splice bars; rail joints; hot rolled bars, including hoops, bands and concrete reinforcing bars; cold finished bars; pipe and tubes, except conduit; wire rods; wire as drawn, not including further fabrications therefrom; black plate; tin and terne plate; sheets; strip; tool steel bars, including high speed; steel wheels and axles, for railroad use only; railroad locomotive tires; armor plate; ordnance forgings; steel castings, rough as cast; skelp; rolling mill rolls; ingot molds and coke for use in the production of pig iron and ferro-alloys.

The A-1-a rating and the A-10 rating contained in the original order are included in the amendment and A-1-a is for use for emergency breakdowns and A-10 to obtain material for all other repairs and maintenance.

National Malleable to Expand

••• National Malleable & Steel Castings Co. will expand its Sharon, Pa., plant at a cost of \$1,500,000.

PRP Reduces Paper Work, Continental Screw Finds

••• A reduction in paper work, the ability to group purchases to obtain the benefit of quantity price differentials and the ability to anticipate to some degree the raw materials required to fill emergency orders are among the advantages of using the Production Requirements Plan, as compared with blanket preference orders, according to H. F. Phipard of Con-

tinental Screw Co., New Bedford, Mass.

This report of a metal company's practical experience with PRP, as told to THE IRON AGE, is of particular interest at this time when WPB is slowly switching all industry over to PRP by permitting blanket preference orders to expire without renewing.

Mr. Phipard stressed that Continental's priority problems were no different than any other manufacturer's. The company receives

priority rated orders ranging from a few screws requiring less than \$1 worth of raw material to large orders valued at thousands of dollars.

"Manufacturers expect to get prompt delivery of screws from stock," Mr. Phipard said, explaining why he favored to shift to PRP. "On special screws which are not stocked, it is expected that material will be on hand so that delivery will only be a matter of the short time required for the manufacture of the screws. Even the war was not able to change this way of thinking.

"Therefore, we had a large number of rush orders from a great many customers, many of these orders for small amounts, waiting around for raw material to come in. Every possible kind of priority and preference rating was represented in this collection.

"In spite of all we could do, we were rapidly losing ground in trying to fulfill our raw material requirements and our sources of supply grew more and more critical of the multitude of certificates they must clear to enter one of our orders. We also had great difficulty at the end of each month in making out the different reports.

"At this point, it seemed as if any change must be for the better so we welcomed the chance to try the Production Requirements Plan. At first we thought the detail involved in making out form PD-25A just as bad as the old certificate detail but we soon found that this form is relatively easy to handle once your records are set up for it and, best of all, it covers a three month period.

"This means only one priority filing every three months instead of myriad reports every month. Our orders, now that they cover three months, instead of 10 min. requirements, are large enough to earn the lower, quantity, prices and are large enough to be attractive to our suppliers. Delivery on our orders has improved unbelievably under the Production Requirements Plan.

"Most important of all, perhaps, is the fact that we can order, with priority assistance, before our customers place their orders with us.

"We consider the Production Requirements Plan an important step toward victory on the production front.



ABILITY

Under the Hat

is What Counts!

R-S Furnaces are "tailor-made" for the particular heat-treatment of a particular product in a particular plant. This calls for engineering ability of high calibre—ability to pool experience and take advantage of local conditions for quick, quantity and quality production.

For resourcefulness, inventiveness and downright engineering skill, R-S Engineers are equal to the best. Add to this the foresight of preparation for quick delivery and you can do no better than to invest in an R-S Furnace, regardless of your product or heat-treating requirements.

Write or wire for detailed information.

R-S PRODUCTS CORPORATION
4524 Germantown Ave.
Philadelphia, Pa.



R-S FURNACES OF DISTINCTION

New Slash in Steel Use in Consumer Goods Expected

... Another steel conservation order, slashing consumer goods production sharply, was expected to be issued in about 10 days early this week. It will mean more casualties in the metalworking field.

At first glance the long list of consumer items to be banned under the order, according to plans developed late last week, might seem trifling from the steel consumption standpoint, but actually a surprisingly large amount will be saved.

The new list is believed to include automatic pencils, air rifles, coat hangers, ash trays, automatic cigar lighters, bed pans, bread boxes, lavatories, urinals, sitz baths, foot baths, dog beds, canary cages, water pistols, dog bars, door knockers, fence posts, BB shot, percolators and roasters, cuspidors, several types of cans, bobby pins, and a couple of hundred other items.

According to estimates made by officials in Washington late last week, the coat hanger ban will save 20,000 to 25,000 tons of steel per year. The BB shot market consumes around 3000 tons of steel per year, and the bobby pin market uses around 8000 tons of steel per annum, about half of which will be saved under the expected order.

Last week executives of many of the above industries were rushing to the iron and steel branch in Washington and to district WPB priority and contract distribution offices. Some attempted to stave off or soften the blow; others were seeking to convert to war work. One coat hanger maker believed he had succeeded in making arrangements for new equipment which would enable him to pro-

List of items previously banned or scheduled to be banned appears on page 109.

duce a small ammunition part. A Chicago sink maker after 10 days in Washington was hopeless about the outlook as he couldn't even get steel for high priority business placed in February.

War production officials at Washington expressed the private view late last week that a large

segment of industry affected by the forthcoming order will not be able to convert to war production. Very few will obtain prime contracts and some time will be required before many land subcontracts.

The effect of the forthcoming

order is so far reaching that there will be a flareup of criticism, charges that certain industrial interests are trying to freeze out other firms, and much confusion in general. When the order becomes effective OPA will face new problems in stabilizing prices on items remaining free of restrictions.

The forthcoming list comes on top of a long list of consumer durable goods previously banned

Specialists in **OILPROOF** **ANTI-CORROSIVE** **WRAPPINGS**

As the largest manufacturer of specialty packaging papers, we have long made anti-corrosive and oilproof wrappings for annular bearings and small machine parts.

Recently, at the request of firms in the aviation industry, we perfected a complete line of special anti-corrosive wrappings for the protection and long-term storage of all metal products.

These papers have proven anti-corrosive properties, combined with oilproofness, strength, pliability and moisture-vapor-proofness. They can be "tailor-made" to your specifications if necessary.

Write for Samples and Technical Bulletin No. 81

RIEDEL PAPER CORPORATION

342 MADISON AVENUE, NEW YORK, N. Y.

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PRIORITIES

by WPB, or scheduled to be curtailed in the near future. This list is reproduced in the story below.

Behind these orders looms the critical semifinished steel situation, which is daily growing more pressing as ammunition production enters its stride on top of the shipbuilding, tank and railroad, and other burdens. Bar mills now face a tremendous load and may soon be in the position of plate mills, whose schedules are controlled by Washington. In fact, late last week a new survey of bar

mills was inaugurated, with all producers urged to supply full information on sizes and capacity for the benefit of Washington.



WPB Appoints Automobile Battery Advisory Committee Washington

••• The formation of an Automotive Battery Industry Advisory Committee has been announced by the WPB Bureau of Industry Ad-

visory Committees. R. L. Vaniman is government presiding officer. Committee members are:

A. J. Baracree, Am-Plus Storage Battery Co., Chicago; Edward Becker, Merry-Bean Co., San Francisco; G. W. Douglas, Douglas Battery Mfg. Co., Winston-Salem, N. C.; E. T. Foote, Globe-Union, Inc., Milwaukee; A. Foster, Battery Division, Norwalk Tire & Rubber Co., Norwalk, Conn.; J. H. McDuffee, Electric Auto-Lite Co., Toledo, Ohio; B. F. Morris, Thomas A. Edison, Inc., Kearny, N. J.; Lester Perrine, Perrine Quality Products Corp., Waltham, Mass.; Arthur G. Phelps, Delco-Remy Division, General Motors Corp., Anderson, Ind.; W. F. Price, Price Battery Corp., Hamburg, Pa.; L. B. Raycroft, Electric Storage Battery Co., Philadelphia; G. W. Taylor, American Battery Co., Nashville, Tenn.



Metal Window Group Named Washington

••• The WPB Bureau of Industry Advisory Committees has announced the formation of a Metal Window Industry Advisory Committee. John L. Haynes is government presiding officer. Committee members are:

J. A. Sargent, Truscon Steel Co., Youngstown, Ohio; Frank Garratt, Hope's Windows, Inc., Jamestown, N. Y.; Clark Robertson, Crittall-Federal, Inc., Waukesha, Wis.; Eugene Bogert, Jr., Bogert & Carrough Co., Paterson, N. J.; Loring Washburn, S. H. Pomeroy Co., Inc., New York; C. A. Raquet, Detroit Steel Products Co., Detroit; F. A. Mesker, Mesker Bros. Iron Co., St. Louis; E. L. Soule, Soule Steel Co., San Francisco; D. Lawrence Carlson, Lundell-Eckberg Mfg. Co., Jamestown, N. Y.; C. R. Wilkins, Rol-screen Co., Pella, Iowa.



South American Shipments

••• Mining machinery manufacturers are given permission to ship to South American copper companies operating under preference rating order P-58, to iron and steel producers under P-68, and to smelters under P-73. Preference ratings assigned under order P-56, according to the amendment, may be used for this purpose.

Upon application, special permission may also be given by the WPB Director of Industry Applications for deliveries of material obtained by use of ratings assigned under P-65-a to fill other rated orders.

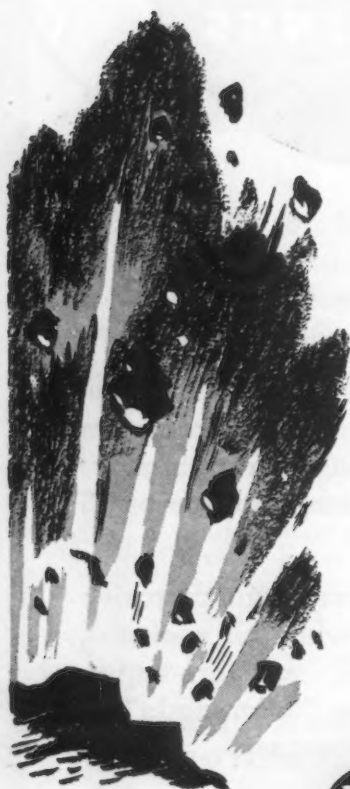


Used Steam Boilers

••• Used electrical generating equipment and steam boilers were frozen last Saturday by WPB. Dealers may not sell, lease or op-



A CLEAN HIT WITH A CLEAN BOMB!



EVEN bombs for the dirty business of war are thoroughly cleaned before painting and lacquering.

Speeding manufacturers of war materials are turning more and more to Wyandotte Metal Cleaners for cleaning bomb bodies . . . cartridge cases . . . steel projectiles . . . bomb fins . . . fuses . . . pistons . . . crankshafts . . . and myriads of other war metal-cleaning jobs.

There is a Wyandotte Cleaner for any metal-cleaning problem and for use in *all* types of equipment.



THE J. B. FORD SALES COMPANY, WYANDOTTE, MICHIGAN

PRIORITIES

tion the equipment without specific authorization from WPB. Equipment, which has an actual or market value of less than \$1,000 per unit is exempt.

"Used electrical generating equipment" is defined to mean any used, reconditioned or stationary steel turbine. "Used steel boiler" is defined as any used, reconditioned or stationary steel generating boiler.



Rough Diamonds

••• The filing date asked for reports on rough diamond inventories by WPB order M-109 has been postponed from April 15 to April 30 because of delay in printing necessary forms.



Cast Iron Soil Pipe

••• Cast iron soil pipe has again been subjected to simplification by WPB. Last Saturday, an amendment to Schedule 4 to Limitation Order L-42, effective June 1, ordered discontinuance of "standard," "medium" and "extra heavy" weights, substituting a pipe slightly heavier than "standard." Brass pipe plugs and trap screws were ordered discontinued on cleanouts, ferrules, traps, test tees and other soil pipe fittings.

Permitting a 5 per cent variation on individual lengths, new weights are as follows:

Size (Inch)	Pounds per Single Hub Length	Pounds per Double Hub Length
2	20	21
3	30	31
4	40	42
5	55	57
6	65	68
8	100	105
10	145	150
12	190	200
15	255	270



Metal Casket Advisers Named Washington

••• The Bureau of Industry Advisory Committees on April 9 announced the formation of a Metal Casket and Metal Burial Vault Industry Advisory Committee. M. D.

Moore is government presiding officer. Committee members are:

Ralph Christian, president, Merit Co., Chicago; Walter E. Wallace, president, Bell & Wallace Sheet Metal Mfg. Co., Richmond, Ind.; William Gardner, president, St. Louis Casket Co., St. Louis; Dietz Keller, York-Hoover Body Co., York, Pa.; Largent Parks, vice-president, Dallas Coffin Co., Dallas, Tex.; Armin Mauthe, president, Northern Casket Co., Fond du Lac, Wis.; P. A. Pierce, general manager, Champion Co., Springfield, Ohio; A. F. Beck, president, Clark Grave Vault Co., Columbus, Ohio; W. C. A. Bickham, president, Wyandotte Vault Co., Upper Sandusky, Ohio; Martin Winkler, Jr., president, West Coast Casket Co., Los Angeles; H. L. Stein, National Casket Co., Boston.

List of Items Previously Curtailed by WPB

••• Products whose manufacture has been prohibited by WPB are listed below, together with the dates when production must cease. Also included are products in which critical materials may not be used after specified dates. Materials which may not be used in this latter group of products are given in parentheses. An example of this is curtain rods, which may

Product	Order No.	Prohibition Date
Automobiles	Various orders and dates.	
Amusement machines	L-21	April 30
Ash trays and smoking stands (metal)	L-13 & 62	May 31
Awning frames and supports (metal)	L-62	May 31
Billboards, metal signs	L-29	June 30
Burial vaults, morticians' goods (metal, except gold and silver)	L-64	June 30
Caskets (metal, except gold and silver)	L-64	June 30
Chairs, except shipboard use (metal)	L-13 & 62	May 31
Clothes hampers (metal)	L-62	May 31
Clothes racks (metal)	L-62	May 31
Clothes trees (metal)	L-62	May 31
Coat hangers, except wire hook for wood hanger (metal)	L-30	June 30
Curtain rods (metal)	L-30	June 30
Doors, except as required by underwriters' code (metal)	L-13	May 31
Door mats (metal)	L-62	May 31
Dry shavers	L-65	May 31
Electric broilers	L-65	May 31
Electric dryers, hand and face	L-65	May 31
Electric grills	L-62	May 31
Electric ironers	L-6-b	April 15 & May 15
Electric irons	L-65	May 31
Electric percolators	L-65	May 31
Electric roasters	L-65	May 31
Electric toasters	L-65	May 31
Electric waffle irons	L-65	May 31
Electric massagers & vibrators, except medical, profession use	L-65	May 31
Flashlight cases (no iron & steel except essential uses)	L-71	May 31
Flexible steel mats and rugs (metal)	L-62	May 31
Food warmers	L-65	May 31
Furniture, except for shipboard (metal)	L-29 & 13	May 31
Gaming machines	L-21	Jan. 31
Hand mirrors (metal)	L-62	May 31
Hat racks (metal)	L-62	May 31
Juke boxes	L-21	April 30
Kitchen cabinets (home) (metal)	L-62	May 31
Lockers (metal)	L-13	May 31
Metal cabinets, except: enameled filing cabinets, visible record equipment, cases and bases	L-13-b	May 31
Mixers, whippers and juicers	L-65	May 31
Necktie racks (metal)	L-30	June 30
Ornamental steel jackets on heaters, water, gas, etc.	L-42	June 1
Outboard motors, except A-1-k or higher	L-80	Mar. 27
Partitions (metal)	L-13	May 31
Phonographs	L-44	April 23
Picture frames (metal)	L-62	May 31
Plant and flower supports (metal)	L-62	May 31
Portable washing machines	L-6-b	April 15 & May 15
Pressing irons—boudoir & traveling	L-65	May 31
Radiator covers (metal)	L-62	May 31
Radiators, large tube	L-42	June 1
Radio receivers	L-44-a	April 23
Record makers and players	L-44	April 23
Refrigerators	L-5	April 30
Safes and vaults, except A-2 or higher	L-13	May 31
Shoe racks (metal)	L-30	June 30
Shoe trees (metal)	L-30	June 30
Signs (metal)	L-29	June 30
Smoking stands—smokadors (metal)	L-62	May 31
Soap receptacles (metal)	L-30	June 30
Soft drink dispensers	L-38 & 27	April 30
Sun lamps, except for medical profession only	L-65	May 31
Swivel chairs (metal)	L-13	May 31
Table tops for household use (metal)	L-62	May 31
Toilet paper holders (metal)	L-30	June 30
Tooth brush holders (metal)	L-30	June 30
Toys—all types involving specified scarce materials	L-81	June 30
Vacuum cleaners—household	L-18	April 30
Vegetable bins (metal)	L-30	June 30
Vending machines	L-27	April 30
Venetian blinds (metal)	L-62	May 31
Washing machines, household laundries	L-6-b	April 15 & May 15
Wastebaskets (metal)	L-13	May 31
Weighing machines, coin operated	L-21	April 30
Window display advertising, signs only (metal)	L-29	June 30
Windows (metal)	L-80	Mar. 28
Wire racks and baskets, except industrial (metal)	L-62 & L-13-b	May 31

be manufactured after June 30, but no metal may be used after that date. IRON AGE readers are advised to obtain copies of the official limitation orders from their local WPB offices (see THE IRON AGE Priorities Guide, page 22, for addresses) or from the Division of Information, WPB, Washington, D. C. Always specify the number of the order you want, as well as the products covered.

Reconditioned Machinery Deliveries Restricted

••• New, second hand or reconditioned machinery of specified types were prohibited to be delivered unless approved by WPB under Limitation Order L-83 on April 9.

Machinery affected by the order includes: Leather working, tanning, textile machinery and equipment, cotton ginning and delinting, shoe manufacturing and repairing, without exception; paper converting, printing and publishing, bakery, confectionery, beverage bottling, industrial sewing where the value exceeds \$200; pulp and paper making where value exceeds \$1,000, and packaging and labeling machinery except that which is suitable to package

or label canned goods, where the order exceeds \$200.

No prohibition is placed on deliveries of less than \$1,000 worth of parts to repair or maintain a single piece of machinery or a single piece delivered after the date of the order. Deliveries of parts worth more than \$1,000 where there has been an actual breakdown or suspension of operations because of damage or destruction of machinery is permitted.

Manufacturers are not prevented from delivering machinery to a distributor for the purpose of filling an approved order actually received or to replace machinery delivered by a distributor on an approved order, including orders for the armed services, allied governments, and orders bearing A-9 or higher preference rating issued at any time on an original PD-1-a, or P-19-h or PD-3-a certificate countersigned before April 10.

Tracklaying Tractors

••• After Sept. 1, tracklaying tractors of the 17 to 35 hp. class will not be made, WPB announced April 9. In the next five months, manufacturers will be permitted to make 3035 tractors as compared with their estimated possible pro-

duction of 6973 for the balance of 1942.

Imports Order Broadened

••• Because general imports order M-63 failed in a few instances to keep private purchasers out of foreign markets for critical material, WPB amended the order April 8 to include "purchases for import" with the prohibitions against arranging or contracting for the importation of materials listed in the order without specific authorization. Among additional commodities placed under the order are: columbite and columbium ore, a steel alloy, chemical and munitions grades of cotton linters, certain grades of flax, graphite, and tantalum ore.

Tin Use Restricted

••• WPB has issued amendment No. 2 to order M-43 restricting all persons except retailers from selling solder with a tin content of more than 16 per cent, any tin-bearing babbitt metal or tin oxide with these exceptions:

On a preference rating of A-9 or higher; on a preference rating of A-10 or higher where purchase order specifies that the material is to be used for maintenance or repair of existing equipment; and for making tin cans within the definitions of conservation order M-81. The amendment removes limitations on uses of tin for making implements of war.

Electrical Appliances

••• WPB last Thursday restricted production of electrical appliances to 20 per cent of 1941 output between the date of the order and May 31 when non-rated production must cease. Conservation orders M-1-a, M-6-b, M-9-c, M-21-d and M-43-a restricting the use of aluminum, nickel, copper and copper base alloy, alloy steel and tin are made to apply where these restrictions are more severe than those in L-65.

Only exception to the latter rule is in the use of electrical resistance material that may be used out of inventory up to 15 per cent of the amount of such material used in 1941.



"Let 'em alone—isn't industry hollering for scrap metal?"

This Week's Priorities and Prices

Coke producers may apply for adjustment of price ceilings, according to amendments to price schedules No. 29 and 77; changes apply to beehive and by-product grades. (OPA-PM2903)

Industrial machinery of many types subjected to new controls over distribution and production manufacture in order L-83 issued April 10. (WPB-857)

House remodeling facilitated by issuance of priority order P-110 on April 10. (WPB-855)

Paper and pulp machinery industry advisory committee formed. (WPB-861)

Steel warehouse subcommittee of iron and steel industry advisory committee formed. (WPB-862). Warehouse petitions for exception or amendment to price schedule No. 49 answered by OPA. (OPA-PM2909)

Tin use by civilians further restricted by amendments to orders M-43 and M-43-a. (WPB-867)

Zinc oxide dealers and exporters to meet with OPA in New York to discuss prices. (OPA-PM2914)

Electric generating equipment and steam boilers stocks frozen as of 11:59 P.M. April 11. Order affects only used equipment. (WPB 880)

Rubber use as insulation on neutral electrical wires covered by specifications contained in amendment to order M-15-b-1. (WPB-T202)

Truck production for civilian use, under Order L-1-e, will be discontinued after existing quotas have been completed. Issued April 12. (WPB-876)

Anthracite coal sales, under long-term contracts that stipulate price shall be OPA maximum in effect as of delivery date, are allowed by amendment 1 to Maximum Price Regulation 112, effective April 9. (PM-2899)

Non-essential construction halted by Order L-41, effective April 9. (WPB-831)

Copper screening stocks, including uncut rolls in hands of retailers, are frozen by an amendment to Order M-9-c, effective April 9. (WPB-839)

Rubber closures prohibited by Order M-119, issued April 9, to prevent use by manufacturers of food which can no longer be packed in tin. Use of rubber prohibited for packaging specified groups of products after 30 days. (WPB-847)

Copper plumbing fixtures added to the list of articles for which copper or copper base alloys is prohibited by Schedule V-a of order L-42, effective June 15. (WPB-848)

Small tractor manufacture curtailed by Order L-53-a, effective April 9. (WPB-849)

• • •

For copies of above announcements address Division of Information, WPB (or OPA), Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)

Revisions for the Iron Age Priorities Guide

• • • The following data should be added to THE IRON AGE Priorities Guide published with the issue of March 26 to bring the guide up to date.

Under "L Orders," page 12, add:

L-1-f...Extension of 30 days to complete February and March production quotas on trucks for civilian use (4-2-42).

L-21-a...Interpretation restricting production of automatic photographs, weighing and amusement machines (4-13-42).

L-30...Amendments to order L-62 on metal office furniture transferring control over specified items to L-30, on kitchen, household and miscellaneous articles (4-11-42).

L-41...Halts all non-essential construction. Applications to begin construction made by filing forms PD-200 and PD-200-a. Effective 4-9-42.

L-42...Amendment to Schedule IV, effective June 1, limits manufacture of cast iron soil pipe to a single weight; restricts production of fittings; prohibits use of brass for plugs and other parts (4-13-42). Schedule V-a adds 13 plumbing fixtures to list of articles for which use of copper and copper base alloy is prohibited. Effective June 15 (4-9-42).

L-52-a...Bicycle freezing order amended to include all bicycles having frames of more than 17 in. (4-7-42).

L-53-a...Prohibits small tractor manufacture after Sept. 1 (4-9-42).

L-68...Prohibits use of copper or copper base alloy in manufacture of garment closures and other listed items, and restricts use of steel, zinc and zinc base alloys for same items (4-1-42).

L-81...Toy and game limitation order amended to take certain colors, oils, and chemicals out of category of prohibited material until after June 30.

L-83...Assumes control over manufacture and distribution of many types of industrial machinery, effective April 10, and prohibits delivery of certain types of new, secondhand, or reconditioned machinery unless approved.

L-84...Restricts production of electric heating pads (4-4-42).

L-86...Forbids installation of liquefied petroleum gas equipment, except by permission granted on Form

PD-397. Does not include maintenance and repairs of existing equipment. Use of ratings of P-98 and P-46 for operations effected by L-86 is forbidden (4-8-42).

L-97 and L-97-a...Freezing order on railroad equipment in hands of producer. Announcement of a delivery schedule for such items, to be issued shortly (4-4-42).

Under "P Orders," page 5, add:

P-56-a...Amendments to permit companies using ratings assigned by P-56-a to make deliveries to South American copper mines under P-58; iron and steel producers under P-68; smelters under P-73; and on special permission for deliveries under P-65-a (4-13-42).

Under "M Orders," page 9, add:

M-9-b...Extends Copper and Copper Alloy order until revoked, and amends original order in regard to public utilities and consumers (4-1-42).

M-9-c...Amendment curtailing production of copper screenings (4-9-42).

M-9-c-2...Permits use of alloyed copper by jewelry trade until May 15. Thereafter, inventories to be sold to MRC (4-4-42).

M-15-b-1...Amendment No. 4 to restrict use and sale of rubber as insulation on neutral electrical wires, effective May 1 (4-11-42).

M-38-c...Amendment No. 1 curtails use of lead foil or base lead alloy foil for specified uses, effective May 1 (4-6-42).

M-43...Amendment No. 2 restricts sale and deliveries of certain products, as solder, babbitt, etc. (4-10-42).

M-43-a...Amendment No. 1 restricts amount of tin used in automobile body solder and amount used interne plate (4-4-42).

M-63...Amendment No. 4 restricts imports or strategic materials except by permission and expands list of such items, effective 4-9-42. Authorization to purchase or import such materials on form PD-222-c.

M-81...Amendment No. 1 restricting use of tin andterne plate in packing specified soups after June 30, and limiting amount of tin plate used.

PERSONALS

• **H. V. Lauer**, superintendent of the Joliet coke plant of the Carnegie-Illinois Steel Corp. since September, 1939, has been appointed assistant division superintendent, Gary works coke plant and blast furnaces, including Joliet works. **H. H. Jones**, superintendent of maintenance at the Gary works coke plant since March, 1940, has been made superintendent of the Joliet coke plant, succeeding H. V. Lauer. **C. V. Lauer**, who has been second assistant superintendent of Gary works blast furnaces since May, 1936, receives the post of first assistant superintendent of blast furnaces, succeeding A. W. Vincent, retired. **G. P. Burks**, chief chemist of Gary works since September, 1937, succeeds C. V. Lauer as second assistant superintendent of blast furnaces. **E. C. Kennedy**, who has been assistant to superintendent of the Gary works coke plant since February, 1941, receives the post of assistant superintendent of this plant. **O. W. Baldwin**, assistant chief chemist of Gary works since June, 1940, succeeds G. P. Burks as chief chemist, and **G. W. Rimmer** succeeds O. W. Baldwin as assistant chief chemist, Gary works. Mr. Rimmer had been general foreman, Gary works chemical laboratory, since September, 1939.

• **Oscar T. Marzke**, formerly works metallurgist at North Works, Worcester, of the American Steel & Wire Co., Cleveland, has been named works metallurgist, Waukegan, Ill.

• **Wade B. Houk** has been appointed to succeed Mr. Marzke as works metallurgist at North Works.

• **H. S. Worthington**, former general superintendent, Pittsburg, Cal., Works, Columbia Steel Co., has been appointed assistant vice-president—operations of Columbia with offices in San Francisco. **Joseph A. White**, former assistant general superintendent, succeeds Mr. Worthington at Pittsburg. **J. D. McCall**, former assistant general superintendent of Torrance, Cal., Works, succeeds Mr. White, and **Harlow Dotson**, former assistant works engineer at Torrance, becomes assistant general superintendent there.



H. V. LAUER, assistant division superintendent, Gary works, Carnegie-Illinois Steel Corp.



H. H. JONES, superintendent, Joliet coke plant, Carnegie-Illinois Steel Corp.

• **Gaston Estep**, cost analyst in the Chicago office of the Carnegie-Illinois Steel Corp., has been transferred to the Pittsburgh office as assistant chief cost analyst for the corporation. Mr. Estep is succeeded by **James Thomson**, formerly cost analyst at the corporation's Gary works. **James W. Kettle**, industrial engineer at Gary works, has become cost analyst in the plant, succeeding Mr. Thomson.

• **David P. Andrews**, formerly with the American Sheet & Tin Plate Co., Carnegie-Illinois Steel Corp., and Great Lakes Steel Corp., has recently been appointed

secretary in charge of sales of Crown Steel Sales, Inc., Chicago.

• **Wallace K. Brown** has been appointed vice-president in charge of procurement for the Crocker Wheeler Electric Mfg. Co., Am-pere, N. J.

• **Alfred S. Otton** has been relieved of his former duties as advertising manager of the Robbins Conveying Belt Co., Passaic, N. J., in order that he may handle important productive assignments in connection with the war work now being done by the company. Mr. Otton will, in addition, be responsible for both the sales and production end of the screen cloth department at Passaic. **John M. Lupton**, formerly assistant advertising manager, has been promoted to the position of advertising manager.

• **C. A. Cowdrey** has been named sales manager for Drive-All Mfg. Co., Detroit. Mr. Cowdrey for the past 17 years was associated with the Warner & Swasey Co., Cleveland, acting, since 1939, in the capacity of sales promotion manager.

• **William G. Merowit**, of 436 Niagara Street, Buffalo, has been appointed as representative for the Mahr Mfg. Co. in western New York state.

• **Robert H. Ridgway**, for many years an authority on mineral economics and statistics, has been appointed chief of the coal economics division of the Bureau of Mines, U. S. Department of the Interior. He succeeds **F. M. Shore**, who has been promoted to assistant chief of the Bureau's Economics and Statistics Branch.

• **Henry J. Wallace** has been appointed assistant general manager of sales, ordnance, National Tube Co., Pittsburgh. Mr. Wallace has been with National Tube since 1928 when he entered their employ as a student in the company's training course. In 1933 he was made a salesman and in 1938 was appointed manager of sales, Pittsburgh district, which position he held until his present appointment.

• **Sheldon L. Bates** has been appointed Buffalo district sales representative for the Wickwire Spencer Steel Co. to succeed **Gordon L. Crawford**, who has been made assistant general sales manager in New York.

• **F. L. Craddock** has been appointed sales manager of the mixing and process equipment division of the Edge Moor Iron Works, Inc., Edge Moor, Delaware.

• **Frederic I. Lackens**, advertising manager, the Hays Corp., Michigan City, Ind., has been appointed vice-president of the National Industrial Advertisers Association. Mr. Lackens will fill the unexpired term caused by the resignation of Louis Ott, advertising manager, the Ohio Brass Co.

• **Charles M. Craighead** has been named a research metallurgist on the staff of Battelle Memorial Institute, Columbus, Ohio. Mr. Craighead was formerly associated with the Aluminum Co. of America, the Reynolds Metals Co., and the Braeburn Alloy Steel Corp.

• **Clarence E. Stevens**, vice-president in charge of manufacturing of Electrolux, Inc., Old Greenwich, Conn., has resigned from the company because of ill health. **William W. Gumpidge** of Stevenson, Jordan & Harrison, Inc., will be in charge of the plant.

• **John A. Royall** has been elected president of Menasco Mfg. Co., southern California manufacturer of aircraft components. Mr. Royall, who has been executive vice-president, succeeds A. E. Shelton.

• **W. E. Waste** has been appointed general manager of the new Marin Shipbuilding Corp., Sausalito, Cal. The new firm is a division of the W. A. Bechtel Co. and holds a Maritime Commission contract for construction of a yard and vessels. Mr. Waste is former administrative manager of California Shipbuilding Corp., Los Angeles Harbor.

• **D. A. Rhoades** and **H. V. Lindberg** have taken over engineering and administrative responsibilities handled by Harry Davis, superintendent of magnesium activities of Permanente Metals Corp. Mr. Davis was killed in an automobile accident two weeks ago.

• **W. E. Curran**, superintendent of Republic Steel Corp.'s Thomas Works at Birmingham, has become associated with the Rheem Mfg. Co., of Richmond, Cal., as assistant manager of the latter company's new Birmingham plant.

• **Charles P. Gilikson**, former factory representative at Minneapolis for American-Marietta Co., Chicago, has been named assistant to Roland G. Maus, sales manager, with headquarters at the company's main office in Chicago.

• **W. H. Hammond**, sales manager of the hoist, body, and tank divisions and director of branches, has been elected a vice-president of Gar Wood Industries, Inc., Detroit. Others elected vice-presidents are **J. B. Haile**, general manager of the road machinery division and **G. E. Robinson**, manager of the winch division. They will continue as managers of their divisions.

• **J. A. Krugler** has been promoted from general sales manager to vice-president in charge of sales and purchases, Taylor-Wharton Iron & Steel Co. **J. L. Lonergan** has been appointed superintendent of the company's Easton, Pa., plant.

• **William E. Jones** has joined the National Engineering Co., Chicago, as service engineer. Mr. Jones served his foundry apprenticeship at Campbell, Wyant & Cannon Foundry Co. and was with them from 1919 until 1933. In 1936, he joined the Pontiac Motor Division of General Motors Corp. and remained there until joining National Engineering.

• **John Sonnenfeld**, works manager of the Keokuk Steel Casting Co., Keokuk, Iowa, has been elected vice-president in charge of all operations.

• **George H. Lohneis** has been appointed superintendent of industrial relations of Republic Steel Corp. for the Southern District. His offices are at Thomas Works, Birmingham. Mr. Lohneis, recently transferred to the Southern District from one of Republic's northern districts, has been associated with the corporation for a number of years.

• **Alexander M. Hamilton** has been elected executive vice-president in executive control of the Canadian Tank Arsenal operated by the Locomotive Works, an affiliate of the American Locomotive Co.

OBITUARY . . .

• **Harry G. Steele**, president of United States Electrical Motors, Inc., Los Angeles, died last week at his home. He was 60 years old and had been in business in southern California for 24 years.

• **George F. Blasier**, general superintendent of the Buffalo Bolt Co., North Tonawanda, N. Y., died April 9, aged 63 years. Mr. Blasier joined the Buffalo Bolt Co. 36 years ago and was made general superintendent in 1923.

• **Russell E. Waldron**, chief engineer of the Dominion Forge & Stamping Co., Ltd., Walkerville, Ontario, died suddenly on April 7. He was 49 years old. Mr. Waldron joined the staff of the company in 1919 as its chief engineer.

• **Samuel S. Early**, who 10 years ago retired as general manager of the Ames Shovel & Tool Co., North Easton, Mass., and in recent years was prominently identified with banking interests, died April 6, at Brockton, Mass., aged 78 years.

• **Albert F. Schroeder**, retired general manager, secretary and treasurer, of Globe Machine & Stamping Co., Cleveland, died April 7, aged 74 years. Mr. Schroeder had retired from the company in 1922 after serving as an officer since 1901. In World War I Mr. Schroeder served as chairman of Northeastern Ohio Pressed Metal Division of the War Industries Board. He helped to organize the Globe Machine company in 1901.

• **A. U. Flora**, aged 64, president of the National Association of Flat Rolled Steel Manufacturers died recently at Pittsburgh. From 1913 to 1928, Mr. Flora was vice-president of the Trumbull Steel Co. at Warren, Ohio. He became vice-president of the association in 1928 and was made president in 1933.

• **Fred Froemming**, superintendent of the forge shop of the Vilter Mfg. Co., Milwaukee, for 45 years, died April 1 after an illness of five weeks, aged 79 years. He retired several years ago with a record of 47 years of service with Vilter.

MACHINE TOOLS

... SALES, INQUIRIES AND MARKET NEWS

WPB Lists Tools For Schools Incorrectly

Cleveland

... A striking example of the lack of knowledge of some federal departments with respect to the machine tool industry was indicated recently in a letter from a division of the WPB in Washington to a school attempting to secure certain types of machine tools to make available to its technical training classes. In part, the letter to the school applying for preference ratings for certain types of machine tool stated, "Due to the increasing demand of industry devoted entirely to the manufacture of war materials, it becomes imperative that certain high precision machine tools be not diverted from those channels. While we recognize that training of men goes hand in hand with war production, it is believed that in most

cases this program can efficiently continue with somewhat less involved equipment. A list of machine tool equipment available for training purposes is now being mailed, etc., etc."

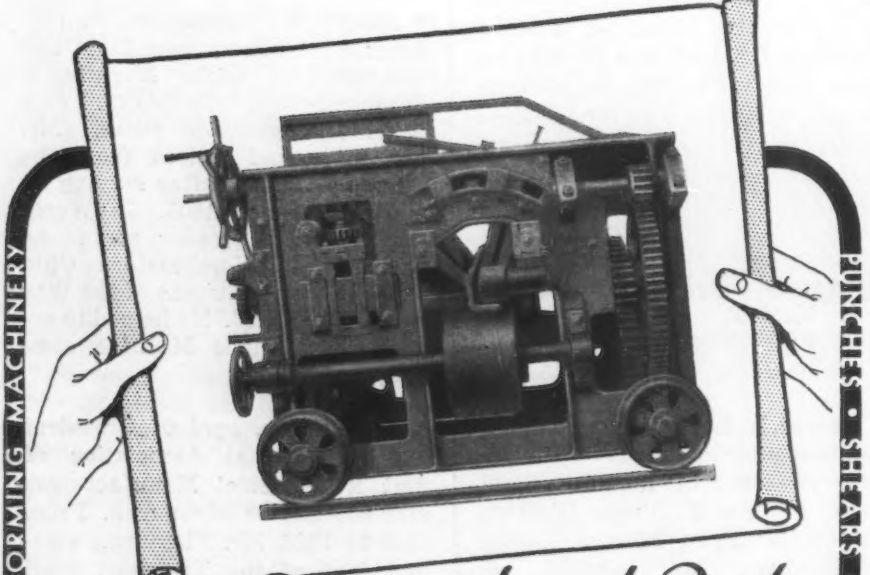
However, the list subsequently received by this school also contained this distinguishing heading, "The War Production Board has advised that preference ratings will be given to school orders for machines manufactured by firms named in this list. Preference ratings will not be given on orders for machines made by many well known manufacturers, since the entire output of these manufacturers is required for defense production work."

The most astonishing aspect of this incident is that the list actually did contain the names of many "well known manufacturers" as well as the names of outstanding concerns whose "entire output

is required for defense production work." The grossest examples of incorrect listings were the Thompson Grinder Co., Gardner Machine Co., and the Covell Manufacturing Co., listed as being sources for grinding machines "available for defense training courses"; Abrasive Tool Co., and the Arter Grinding Machine Co., for surface grinders; the Springfield Machine Tool Co., and the Bradford Machine Tool Co., for lathes; the Acme Machine Tool Co., and Bardons & Oliver, Inc., for turret lathes; Automatic Machinery Mfg. Corp., Bridgeport Machines, Inc., and Reed-Prentice Corp. for milling machines; Charles G. Allen Co. and L. J. Kaufman Mfg. Co., for drilling and tapping machines; the Oliver Instrument Co. for tool and cutter grinders; and the Peerless Machine Co., Racine Tool & Machine Co. and Rasmussen Machine Co., for metal sawing machines. All of these manufacturers produce a superior type of equipment which is in great demand for use in war plants, yet they will be interested to know that in the opinion of a WPB agency their products will be available for schools who will be able to secure high ratings to get such machines.

Judging from the experience of leading machine tool dealers and agencies, from 90 to 98 per cent of current backlogs for most machine tools is in the A-1-a category. The situation in the demand for boring mills is particularly critical and it is reported that the industry is approximately 2500 units behind. This would indicate that some deliveries of present outstanding orders will be made well into 1943. Meanwhile, the flood of orders which hit the industry in March, in some cases representing about three-fourths of the total business booked in 1941, indicates that as a whole the industry is entirely sold out for 1942.

The report in last week's IRON AGE that various concerns throughout the country would be building shell lathes, under agencies delegated by the F. A. Smith Co., was apparently slightly premature, since the entire plan is still in the formative stage.



Designed and Built
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THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, PA.

PRESSES • METAL-FORMING MACHINERY

PUNCHES • SHEARS • SPACING TABLES

The shipyards of the Nation, today playing a major role in our Victory program, appreciate the dependability of Thomas metal-forming equipment. This Angle-Beveling machine is described in Bulletin 102 . . . your copy sent on request!

FABRICATING MACHINERY

NON-FERROUS METALS

... MARKET ACTIVITIES AND PRICE TRENDS

Copper Output and Stocks Reported Up

... Domestic copper production during March was increased substantially, according to the Copper Institute, with crude production nearing all-time high output. Refined production totaled 89,522 tons, against 81,724 tons in February, and March crude output was 92,202 tons, against 80,148 tons produced in February.

While recent restrictions in the use of copper have been widespread there is little evidence of the building up of stocks of refined metal. March refined stocks were 79,537 tons, against stocks of 77,329 tons in the previous month. War work apparently is taking a heavier toll than expected.

Recent estimates of copper stocks built up throughout the country because of orders from Washington freezing supplies and prohibiting their use were set at 300,000 tons. This naturally includes the material in the hands of consumers that will find its way back into war work. How this will be accomplished and how long it will take is problematical. However, the Copper Recovery Corp., an organization suggested by the Copper Institute, may be set up under the R.F.C. to take over these vast stocks of metal.

In the annual financial report of Anaconda Copper Mining Co., for 1941, total refined copper output was set at 657,758 tons; zinc production at 185,591 tons, and lead at 48,128 tons. At Anaconda, Mont., a manganese plant started operation in June, 1941, producing manganese nodules in the largest rotary kiln in the world devoted to production of this material. The vital material is delivered on government order to steel producers for use in open hearth production of armor plate. Also, a mine and a mill for the production and treatment of chromite ores were completed during 1941, and extensions to these mining and mill facilities are contemplated.

First test melts of tin came from the Texas City, Tex., smelter during the past week. It is expected that it will be months be-

fore the unit is up to capacity production. However, it is cheering news to tin users that the smelter will provide at least a new source of supply.

Closure and bottle cap manufacturers in Eastern Pennsylvania are looking for relief from Washington this week. It is reported their black plate requirements will be taken care of by allocation or by issuance of A-1-a or A-1-b priority ratings. However, tin plate that was formerly used is completely out of the picture.

Reverberations from the government seizure of stocks of copper from J. M. Katz Co., New York, from the company warehouses in Peru, Ill., and Allentown, Pa., were forthcoming this week. While the MRC claimed that the 78,000 lb. of copper sheet was seized because the owner refused to sell it to the government, a spokesman

for the company said that the seizure was without explanation. It was claimed that all of the copper used by the firm was for Army contracts and that a recent government investigation proved this claim.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper, Electrolytic ¹	12.00
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis ²	8.25
Lead, St. Louis ²	6.35

¹ Mine producers' quotations only, delivered Con'n. Valley. Deduct ¼c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-16c. a lb.; No. 12 remelt No. 2, standard, 14.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt; Asiatic, nominal, New York; American, 14.50c. a lb., f.o.b. smelter. QUICKSILVER, \$197 to \$199 per 76 lb. flask, f.o.b. shipping point. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.



An Extra Shift for More Production Is A Shift to TRIPLEX Threaded Fasteners

Cramming all the production you can into every shift, you've got to have a fast-stepping supply line of quick-fitting parts and fasteners. TRIPLEX Machine Bolts, Cap and Set Screws and other threaded products help you avoid assembly bottlenecks. Strong, accurate to size, clean threaded. Write for prices. The Triples Screw Company, 5317 Grant Avenue, Cleveland, Ohio.



**CAP AND SET SCREWS ·
BOLTS · NUTS AND RIVETS**

MILLIONS IN USE · EVERYWHERE

SCRAP

... MARKET ACTIVITIES AND QUOTATION TRENDS

Stockpile of Scrap For Difficult Winter Months Is New Goal

••• The scrap picture continues better but early this week it was spotty in several key areas where daily receipts were barely meeting daily consumption.

The hard-pressed areas may become more comfortably situated soon if the nation's strenuous collection efforts continue to yield larger tonnages, as they have been doing recently. Then the scrap industry will turn to its new goal, the building up of the best possible inventory as a hedge against the troublesome 1942-1943 winter months. The need for such a stockpile is obvious and scrap leaders are serious in their effort to build it, although they recognize the difficulties faced.

Steel mill men met in Pittsburgh yesterday to discuss the progress of auto wrecking. A representative of the American Iron & Steel Institute was scheduled to attend. In some areas the auto wrecking program has fallen behind expectations due to the shortage of torchmen or burners. Wreckers may be required to turn over an equivalent tonnage of scrap as their inventory every 60 days, which would bring scrap out from the less cooperative graveyards but might also force up prices.

In Washington last week, dealers pressed their recommendation for a better break in the price of tin can scrap, a differential of \$2 below bundles, instead of the present \$5 and \$8 spreads.

Rail scrap continues exceptionally scarce. In fact, it is reported WPB is requiring railroads to turn in one-third ton of rails for every new ton of rails obtained.

Tires Stolen, Dealer Denied Replacements

Cleveland

••• Jack S. Roth, a scrap iron dealer, was unable to obtain an allocation for tires from his local rationing board, because all of his scrap was not going to war plants. Roth's tires and wheels had been stolen from his car.

PITTSBURGH—Scrap collections are apparently unchanged this week with the flow still easier and expected to be further affected by current scrap drives.

• BUFFALO—Two lake boats, carrying approximately 10,000 tons of mixed scrap, docked recently at Bethlehem's Lackawanna plant. The total movement by vessel this year is expected to exceed 150,000 tons. The local civic drive has exceeded expectations and a bottleneck in trucks to transport scrap from 325 industrial plants has developed. Republic Steel has begun salvaging "several thousand tons" of scrap from its 40-year-old slag dumps in South Buffalo.

• BIRMINGHAM—Recovery of more than 11,000 tons of industrial scrap was achieved during March by an industrial salvage committee of Associated Industries of Alabama.

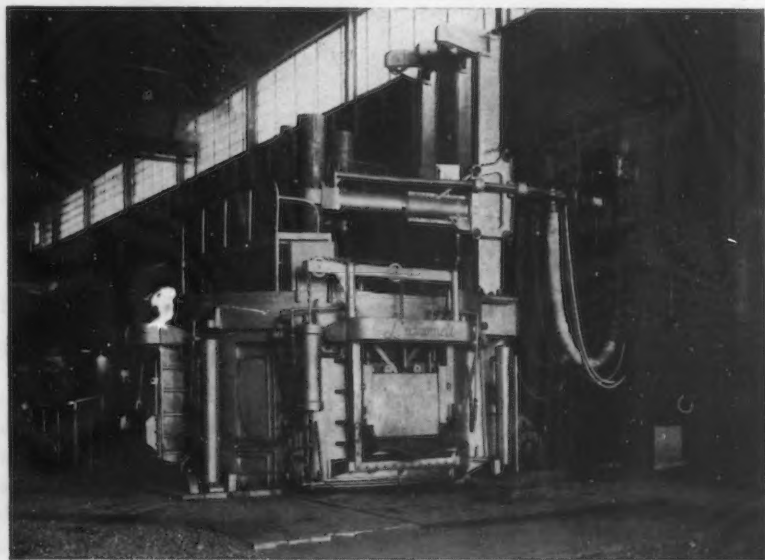
• YOUNGSTOWN—The public scrap campaign originally launched March 29 was continued on Sunday, April 12, and similar drives will be made in Struthers, Lowelville, and Poland. A proposal to scrap four Civil War cannon here was vigorously protested at a Council meeting. One citizen said, "Plenty of scrap is lying idle here." He evinced surprise that scrap yards were "so exhausted that citizens must be asked to give up their historic treasures."

• CINCINNATI—The extraordinary efforts to bring out scrap have eased the situation a bit. One mill indicates that an improvement in the quality of material has also been noted.

• BOSTON—The movement continues to gather momentum, especially auto scrap. Sources of turnings, borings and banded material have expanded noticeably.

• CLEVELAND—Otis Steel Co.'s Lakeside works will recover scrap from its open hearth slag pile, and it is estimated that about 10,000 tons of scrap will thus be made available. The job is being handled under contract by the Pitt Iron Co., Pittsburgh. The dump represents a 5-year accumulation.

THE LARGEST TOP CHARGE ELECTRIC FURNACE IN THE UNITED STATES



LECTROMELT furnaces are built in sizes ranging from 100 tons to 25 pounds. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

PITTSBURGH LECTROMELT FURNACE CORP.
—PITTSBURGH, PA.—

Two-Day Pittsburgh Drive Yields Big Loads of Scrap

Pittsburgh

••• Last Saturday and Sunday Pittsburgh went beyond its wildest hopes in a scrap collection drive which, according to estimates, will net close to 6,000,000 lb. of metal, rubber, rags and paper. This pickup came from approximately 178,000 families with more than 500 trucks going the full length of the city's 800 mi. of streets. Early this week more than 1,000,000 lb. of paper had been separated from the collected scrap and it is estimated when final segregation is made that as much as 3,000,000 lb. of metal will have been collected, about two-thirds iron and steel.

Unusual articles collected included typewriters, washing machines, permanent waving machines, wringers, refrigerators, bath tubs, furnaces, gas stoves and thousands of toys. More than 20 pianos were collected and one citizen turned up 20 brand new tires of a vintage used approximately 20 years ago. One person put a complete automobile, minus motor, on the street curb.

Sale of Rails Over Ceiling Prevented by Court Ruling

Toledo, Ohio

••• Municipalities making sales of any commodity covered by OPA ceilings must comply with the maximum price provisions rather than sell to highest bidder, ruled Judge L. N. Murlin in Common Pleas Court here recently. The decision prevented the city's sale of 320 tons of rails at over the ceiling price.

"Cellar" Price on Canadian Scrap Designed as Aid

Toronto

••• Under a new price policy ordered by F. B. Kilbourn, steel controller, large supplies of scrap iron and steel in Western Canada will be made available. The new order sets a maximum price to be paid for scrap in the Maritime Provinces and in British Columbia. With the demand for scrap increasing to meet war demands, prices throughout Canada now have been placed under strict control. Last year maximums were

established for Ontario and Quebec.

Heavy freight charges have in the past hindered dealers from buying scrap in the Peace River district and other western areas distant from cities where foundries and other consumers of scrap are located. Under the new order a "cellar" price to be paid to the dealer has been established. The price received by the individual selling to the dealer will be slightly below the dealer's cellar, to provide for handling and loading costs.

In British Columbia, Alberta, Saskatchewan and Manitoba, dealers will receive a minimum of \$10 per net ton for cast iron in Saskatchewan, Manitoba and Alberta, \$7 net ton for steel scrap. Loading and handling charges average about \$1.50 per ton, making the price individuals will receive about \$8.50 for cast and \$5.50 for steel scrap. These prices will apply through the provinces specified on the order, regardless of the cost of freight to move the scrap to the ultimate consuming point.

The prices quoted in the orders

apply to No. 1 cast iron, and differentials for lower grades vary from \$2 to \$3 per ton below these prices.

In New Brunswick, Nova Scotia and Prince Edward Island, where there is no serious freight problem, prices are controlled, as in Ontario and Quebec, by maximum prices that may be paid by the ultimate consumer at basing points. Under this plan the maximum price for cast iron scrap at Moncton, N. B., Sackville, N. B., and Amherst, N. S., is \$21.50 a ton. The prices will be proportionately less where freight charges are incurred, and allowances also will be made for loading and handling in the price individuals receive.

Rail for Structural Use Put Under Scrap Schedule

••• Maximum prices for used rail sold for structural purposes, counterweights, fence posts and the like are governed by the price schedule for scrap, rather than the schedule for relaying rail, OPA ruled last week.

Turn Page for Scrap Prices



Because XLO Music Wire has such a great variety of important uses it is in constant demand.

Johnson Steel & Wire has enlisted a heavy production for the war. All sizes from .003 to .200. Conveniently packaged in 1/4 lb., 1/2 lb., 1 lb. and 5 lb. units.

XLO Music Wire meets all commercial and governmental specifications for high grade spring wire, has a background of three generations of wire drawing experience.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER * MASSACHUSETTS.

SCRAP PRICES

(All the prices given below are per gross tons and are basing point prices from which shipping point prices and consumer's delivered prices are to be computed)

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

	BASIC OPEN HEARTH GRADES (No. 1 Heavy Melting; No. 1 Hydr. Com- pressed Black Sheets; No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)			Machine Shop Turnings	BLAST FURNACE GRADES (Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)		ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES											
							Low Phos.			Heavy Structural and Plate			Cut Auto. Steel Scrap			Alloy free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundling
							Billet, Bloom, Forge Crops	Bar Crops and Smaller	Punch- ings and Plate	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under			
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....																		
Cleveland, Middletown, Cincinnati, Portsmouth.....	\$20.00			\$16.00		\$16.00	\$25.00	\$22.50	\$22.50	\$21.00	\$21.50	\$22.00	\$20.00	\$20.50	\$21.00	\$18.00	\$19.50	\$21.00
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt....	19.50			15.50		15.50	24.50	22.00	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Ashland, Ky.....	18.75			14.75		14.75	23.75	21.25	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Buffalo, N. Y.....	19.50			15.50		15.50	24.50	22.00	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Bethlehem, Pa.; Kokomo, Ind.....	19.25			15.25		15.25	24.25	21.75	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Duluth, Minn.....	18.25			14.25		14.25	23.25	20.75	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Detroit, Mich.....	18.00			14.00		14.00	23.00	20.50	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
Toledo, Ohio.....	17.85			13.85		13.85	22.85	20.35	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
St. Louis, Mo.....				13.85		13.85												
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.50			13.50		13.50	22.50	20.00	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Minneapolis, Colo.....	17.00			13.00		13.00	22.00	19.50	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Seattle, Wash.....	16.50			12.50		12.50	21.50	19.00	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Portland, Ore.....	14.50			10.50		10.50	19.50	17.00	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
								15.50	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

BUNDLES with less than 50% tin coated material are \$5 per gross ton below basic open hearth grades; those with more than 50% tin coated material are \$8 below basic open hearth grades.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. Published dock charges prevail, or if unpublished 75c. per ton must be included as part of the deduction.* Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus lowest switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

*At Memphis deduct 50c.; Great Lakes ports \$1; New England \$1.25.

REMOTE SCRAP: Defined as all grades of scrap listed in table above located in North Dakota, South Dakota, Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon and Utah. The delivered price of remote scrap may exceed by more than \$1, but not more than \$5, the price at the basing point nearest the consumer's plant, provided detailed statement under oath is furnished OPA. Where delivered price would exceed by more than \$5 the price at basing point nearest consumer, user must apply to OPA for permission to absorb the additional charges. For exceptions see official order.

UNPREPARED SCRAP: The maximum prices established hereinabove are maximum prices for prepared scrap. For unprepared scrap, maximum prices shall be \$2.50 less than the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order).

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed.

CAST IRON BORINGS: (No more than 0.5 per cent oil content; for chemical use), add \$5 to price of cast iron borings.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA, of the shipping point, transportation charges and details of the sale.

RAILROAD SCRAP

(Per gross ton, delivered consumers' plants located on line.)

	Scrap Rails					
	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	3 ft. and Under	2 ft. and Under	18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown.....	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington, Birmingham, Los Angeles, San Francisco.....	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo.....	18.00	19.00	20.50	21.00	21.25	21.50
Detroit.....	20.25	21.25	22.75	23.25	23.50	23.75
Duluth.....	18.85	19.85	21.35	21.85	22.10	22.35
Kansas City, Mo.....	19.00	20.00	21.50	22.00	22.25	22.50
Kokomo, Ind.....	17.00	18.00	19.50	20.00	20.25	20.50
Seattle.....	19.25	20.25	21.75	22.25	22.50	22.75
St. Louis.....	15.50	16.50	18.00	18.50	18.75	19.00
	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

Other Than Railroad Scrap

	Group A			Group B		Group C	
	No. 1 machinery cast, drop broken, 150 lbs.	No. 1 cupola cast.....	and under.....	Clean auto cast.....	Unstripped motor blocks.....	Stove Plate.....	Heavy Breakable Cast.....
	\$18.00	18.00	19.00	18.00	17.50	17.00	15.50
			19.00	19.00	18.50	18.00	16.50
			20.00	20.00	19.50	19.00	17.50
							18.00
							19.00
							20.00
							21.00
							22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switch district of Kansas City, Kan., Mo.

Construction Awards at New Quarterly Peak

••• The dollar value of engineered construction during March rose to \$729,485,000, the second highest monthly total ever reported by the Engineering News-Record. The March total brought the volume for the first quarter of 1942 to \$1,993,008,000, a new all-time high and 36 per cent above the previous peak established in the opening quarter of 1941.

Public construction was responsible for the gains, topping February's mark by 17 per cent and totaling \$375,013,000. Both state and municipal construction, making up the public construction total, gained over the total for the previous month.

Three classes of engineered buildings: public, industrial, and commercial, made up 72 per cent of the first quarter's volume and registered a 47 per cent gain over the total for the corresponding 1941 period. Over \$1,262,000,000 of the \$1,993,088,000 first quarter volume was for public structures.

Weekly Bookings of Construction Steel in Tons

Week Ended	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941	Year to Date	
	1942	1942	1942	1941	1942	1941
Fabricated structural steel awards	29,585	33,500	3,000	23,350	343,595	474,435
Fabricated plate awards	0	0	0	120	10,650	49,905
Sheet steel piling awards	0	0	0	550	790	14,430
Reinforcing bar awards	26,230	37,950	39,500	25,800	508,705	194,600
Total letting of Construction Steel	55,815	71,450	42,500	49,820	863,740	733,370

Two Year Old Firm To Expand Plants

••• N. A. Woodworth Co., of Michigan, has been allocated funds for additional war production machinery and equipment, which will make the firm one of the most important sources of precision aircraft engine parts in the country. Only two years old, the company has been awarded orders totaling about \$15,000,000 for more than 100 precision war parts. Three plants are now in operation, two devoted to making parts and the third to heat treating and plating.

Steel Office Equipment Builder Substitutes Wood

••• The All-Steel Equipment Co., here announced this week that a new line of office files, made of wood instead of steel, has been introduced. While the idea of substituting wood for steel and other critical materials that are widely needed for war production is not new, the company is among the first to inaugurate the change-over. Marketed as "Patriot Wood Files," the line includes three styles, each in two quality and price grades.

Weekly Ingot Output Rises in February

	STEEL INGOT OUTPUT IN NET TONS					PER CENT OF CAPACITY			
	Open Hearth	Bessemer	Electric	Total	Weekly Output	Open Hearth	Bessemer	Electric	Total
1941									
January	6,276,429	451,637	200,019	6,928,085	1,563,902	99.1	76.0	91.0	96.9
February	5,673,289	378,330	186,281	6,237,900	1,559,475	99.2	70.5	93.9	96.6
March	6,461,936	460,169	209,536	7,131,641	1,609,851	102.0	77.4	95.4	99.7
1st Quarter	18,411,654	1,290,136	595,836	20,297,626	1,578,353	100.1	74.8	93.4	97.8
April	6,135,941	395,009	225,999	6,756,949	1,575,046	100.0	68.6	106.2	97.6
May	6,365,172	444,361	243,705	7,053,238	1,592,153	100.5	74.8	110.9	98.7
June	6,103,767	458,242	238,721	6,800,730	1,585,252	99.5	79.6	112.2	98.2
2nd Quarter	18,604,880	1,297,612	708,425	20,610,917	1,584,237	100.0	74.3	109.8	98.2
1st 6 months	37,016,534	2,587,748	1,304,261	40,908,543	1,581,312	100.1	74.5	101.6	98.0
July	6,089,859	489,239	242,584	6,821,682	1,543,367	94.4	85.0	87.4	93.4
August	6,243,100	495,523	262,334	7,000,957	1,580,351	96.6	85.9	94.4	95.7
September	6,058,731	500,687	260,288	6,819,706	1,593,389	97.0	89.8	96.9	96.4
3rd Quarter	18,391,690	1,485,449	765,206	20,642,345	1,572,151	96.0	86.8	92.9	95.2
9 months	55,408,224	4,073,197	2,069,467	61,550,888	1,578,228	98.7	78.6	98.2	97.0
October	6,427,977	532,863	281,843	7,242,683	1,634,917	99.4	92.3	101.4	99.0
November	6,198,368	488,986	282,633	6,969,987	1,624,706	99.0	87.5	105.0	98.3
December	6,395,387	481,706	286,906	7,163,999	1,620,814	99.2	83.6	103.4	98.1
4th Quarter	19,021,732	1,503,555	851,382	21,376,669	1,626,839	99.2	87.8	103.2	98.5
Total 1941	74,429,956	5,576,752	2,920,849	82,927,557	1,590,479	98.8	80.9	99.6	97.4
1942									
January	6,332,628	490,864	305,859	7,129,351	1,609,334	95.4	86.0	96.3	94.7
February	5,795,932	453,543	275,636	6,525,111	1,631,278	96.7	88.0	96.1	96.0

Source: American Iron and Steel Institute. The percentages of capacity operated in the first 6 months of 1941 are calculated on annual capacities as of Jan. 1, 1941, as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on annual capacities as follows: Open hearth 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons. The percentages of capacity operated in 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, bessemer 6,721,400 net tons, electric 3,737,510 net tons.

Comparison of Prices . . .

(Advances Over Past Week in **Heavy Type**; Declines in *Italics*. Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Tin plate	\$5.00	\$5.00	\$5.00	\$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00

Wire and Wire Products: (Cents Per Lb.)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
No. 2 fdy., Philadelphia	\$25.84	\$25.84	\$25.84	\$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	30.34
Ferromanganese†	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Heavy melting steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	23.00	23.00	23.00	23.00
No. 1 cast, Pittsburgh	22.00	22.00	22.00	23.25
No. 1 cast, Philadelphia	24.00	24.00	24.00	24.00
No. 1 cast, Ch'go*	21.00	21.00	21.00	22.60

*Changed to gross ton basis April 3, 1941.

Coke, Connellsville: (Per Net Ton at Oven)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Furnace coke, prompt	\$6.00	\$6.00	\$6.00	\$5.625
Foundry coke, prompt	6.875	6.875	6.875	6.25

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)	Apr. 14, 1942	Apr. 7, 1942	Mar. 17, 1942	Apr. 15, 1941
Copper, electro., Conn.*	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.125
Zinc, East St. Louis	8.25	8.25	8.25	7.25
Lead, St. Louis	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 118 to 126 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices . . .

FINISHED STEEL		PIG IRON		SCRAP STEEL	
April 14, 1942	2.30467c. a Lb.	\$23.61	a Gross Ton	\$19.17	a Gross Ton
One week ago	2.30467c. a Lb.	\$23.61	a Gross Ton	\$19.17	a Gross Ton
One month ago	2.30467c. a Lb.	\$23.61	a Gross Ton	\$19.17	a Gross Ton
One year ago	2.30467c. a Lb.	\$23.61	a Gross Ton	\$19.17	a Gross Ton

HIGH		LOW		HIGH		LOW	
1942	2.30467c.,	2.30467c.,		\$23.61	\$23.61	\$19.17	\$19.17
1941	2.30467c.,	2.30467c.,		\$23.61	\$23.61	\$19.17	\$19.17
1940	2.30467c., Jan. 2	2.24107c., Apr. 16		23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16		22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18		23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4		23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.32263c., Dec. 28	2.05200c., Mar. 10		19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8		18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2		17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2		16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1		14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29		15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9		18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29		18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars **	Pacific Ports, Cars **	Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes ²	3.80¢		3.80¢									-4.55¢			
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled ⁴	2.80¢	2.90¢					2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10						\$5.32
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (1 st)			3.37¢
TERNES, M'FG.															
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ ⁽¹¹⁾		2.45¢	2.65¢	2.25¢	2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢				(Coatesville = 3.50¢)					3.95¢	4.15¢		3.70¢	3.37¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
WIRE⁹															
Bright	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)				3.10¢			2.92¢
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)				3.10¢			2.92¢
Spring	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)				3.80¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢
IRON BARS¹²															
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturer. ¹⁰ Boxed. ¹¹ Ship plates only. ¹² Common iron bars quoted at 2.15c. by Terre Haute, Ind., producer. ^{**} Gulf and Pacific Ports prices shown here do not apply if the customary means of transportation (rail and water) is not used.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2 higher; f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling \$34.00
Forging quality 40.00

Shell Steel

Basic open hearth shell steel, f.o.b. Pittsburgh and Chicago.

Per Gross Ton
3 in. to 12 in. \$52.00
12 in. to 18 in. 54.00
18 in. and over 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.) Per Lb.
Pittsburgh, Chicago, Cleveland. 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Alloy Steel Blooms, Billets and Slabs

Per Gross Ton
Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem \$54.00

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse) Base per Lb.

High speed 67c.
Straight molybdenum 54c.
Tungsten-molybdenum 57½c.
High-carbon-chromium 43c.
Oil hardening 24c.
Special carbon 22c.
Extra carbon 18c.
Regular carbon 14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. See THE IRON AGE, Dec. 25, 1941, page 88, for details of OPA Price Schedule No. 49, covering steel resale prices. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. city prices are used in conformance with Schedule 49.)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	\$3.35	\$3.25	\$3.35	\$3.55	\$3.58	\$3.43	\$3.25	\$3.71	\$3.45	\$3.39	\$3.50	\$3.38	\$4.95
Sheets, cold rolled	4.10	4.05	4.05	4.05	4.60	4.30	4.30	4.68	4.24	4.35	4.23	7.50	
Sheets, galvanized	4.65	4.85	4.62	5.05	5.00	4.84	4.75	5.11	4.75	4.99	5.00	4.98	5.95
Strip, hot rolled	3.60	3.60	3.50	3.51	3.96	3.68	3.82	4.06	3.70	3.74	3.85	3.73	4.90
Strip, cold rolled	3.20	3.50	3.20	3.31	3.51	3.40	3.52	3.46	3.61	3.83	3.54	3.54	
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.90
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.60
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.35
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.45	7.35	7.55	7.31	7.60	7.67	7.35	7.75	7.72	7.45	7.58	9.55	
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	6.02	6.00	5.88	8.55	
Bars, cd. drn. SAE 2300	8.40	8.40	8.40	8.56	8.84	8.70	8.40	8.88	8.77	8.84	8.63	10.55	
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	7.12	7.44	6.98	9.55	

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, \$3.43.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorous	Charcoal
Boston	\$25.50	\$25.00	\$26.50	\$26.00		
Brooklyn	27.50			28.00		
Jersey City	26.53	26.03	27.53	27.03		
Philadelphia	25.84	25.34	26.84	26.34		
Bethlehem, Pa.	\$25.00	\$24.50	\$26.00	\$25.50		
Everett, Mass.	25.00	24.50	26.00	25.50		
Swedeland, Pa.	25.00	24.50	26.00	25.50		
Steelton, Pa.		24.50			\$29.50	
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	
Sparrows Point, Md.	25.00	24.50				
Erie, Pa.	24.00	23.50	25.00	24.50		
Neville Island, Pa.	24.00	23.50	24.50	24.00		
Sharpsville, Pa.*	24.00	23.50	24.50	24.00		
Buffalo	24.00	23.00	25.00	24.50	29.50	
Cincinnati	24.44	24.61		25.11		
Canton, Ohio	25.39	24.89	25.89	25.39		
Mansfield, Ohio	25.94	25.44	26.44	25.94		
St. Louis	24.50	24.02				
Chicago	24.00	23.50	24.50	24.00		\$31.34
Granite City, Ill.	24.00	23.50	24.50	24.00		
Cleveland	24.00	23.50	24.50	24.00		
Hamilton, Ohio	24.00	23.50		24.00		
Toledo	24.00	23.50	24.50	24.00		
Youngstown*	24.00	23.50	24.50	24.00		
Detroit	24.00	23.50	24.50	24.00		
Lake Superior fc.						\$28.00
Lyles, Tenn. fc.†						33.00
St. Paul	26.63		27.13	26.63		
Duluth	24.50		25.00	24.50		
Birmingham	20.38	19.00	25.00			
Los Angeles	27.50					
San Francisco	27.50					
Seattle	27.50					
Provo, Utah	22.00					
Montreal	27.50	27.50		28.00		
Toronto	25.50	25.50		26.00		

GRAY FORGE IRON

Valley or Pittsburgh furnace \$23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

†Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace. Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

Other
official

coal

\$31.34

and Steel
foundry.

within

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urnace.
exceed

details
ssarily

Los

Angeles

\$4.95

7.50

5.95

4.90

4.90

4.60

4.35

6.60

9.55

8.55

10.55

9.55

lvanzized

Excep.

Detroit.

971 in.

3999 lb.

in. and

d rolled

999 lb.

99 lb.



* Like a SABOTEUR in the shipping Room -

Lack of proper protection... while in transit, or in storage

Faulty packing, insecure wrapping or improper materials can cause as much damage and delay as *deliberate* sabotage. Goods damaged in shipment cost this nation badly needed materials and man-hours of labor. They waste valuable shipping space in train, truck or boat, and their failure at a critical time, when needed most, may prove a disaster.

There's no place, in time of war, for such costly hazards.

That's why FIBREEN is taking its place as an essential material in America's war program. It provides exceptional protection, at low cost, for goods in transit or in storage.

It safeguards the vital flow of materials, parts, and finished goods of war—from mill, to sub-contractor, to assembly line—and to all parts of the country and abroad.

FIBREEN is a tough, waterproof paper, reenforced with two plies of closely spaced steel-like fibres, embedded in two layers of special asphalt, between two sheets of kraft. It's clean, pliable, easy to use—as a wrapping, a lining for crates, and as a superior replacement for fabrics and materials no longer obtainable.

Production of FIBREEN is now being diverted to uses essential to the war program. If your products fall in this class—if you're interested in better packing methods and materials—we will try to help you. Write, explaining what you ship, and how you now pack it.

THE SISALKRAFT CO.

Manufacturers of Sisalkraft, Fibreen, Sisal-X, Sisaltape and Copper-Armored Sisalkraft.

205 W. WACKER DRIVE • CHICAGO, ILL.
NEW YORK SAN FRANCISCO LONDON SYDNEY

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FIBREEN
EFFECTIVE *Protection* IN TRANSIT
IN STORAGE - FOR EMERGENCY USES



SERVING INDUSTRY, CONSTRUCTION AND AGRICULTURE THROUGHOUT THE WORLD

PRICES

CORROSION AND HEAT- RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.73c.	16.15c.	19.13c.	23.38c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	25.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
*Motor	4.95c.
*Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 75c. per 100 lb.

*In some instances motor grade is referred to as dynamo grade and dynamo grade is referred to as dynamo special.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per
Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C. ...	\$6.00	\$12.00
15-lb. coating I.C. ...	7.00	14.00
20-lb. coating I.C. ...	7.50	15.00
25-lb. coating I.C. ...	8.00	16.00
30-lb. coating I.C. ...	8.63	17.25
40-lb. coating I.C. ...	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)
Per Cent Off List

Machine and Carriage Bolts:

6½ in., shorter and smaller...	65½
6 x ¾ in., and shorter.....	63½
6 in. by ¾ to 1 in. and shorter.	61
1½ in. and larger, all length..	59
All diameters over 6 in. long..	59
Lag, all sizes.....	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

	(Hexagon or Square)
½ in. and smaller.....	62
9/16 to 1 in. inclusive.....	59
1½ to 1½ in. inclusive.....	57
1½ in. and larger.....	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller....	64	
½ in. and smaller.....	62	
½ in. through 1 in.....	60	
9/16 to 1 in.....	59	
1½ in. through 1½ in..	57	58
1½ in. and larger.....	56	

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk.....	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	\$3.75

Small Rivets

(7/16 in. and smaller)

	Per cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

Per cent Off List

Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	68
Milled studs	40
Flat head cap screws, listed sizes	30
Filister head cap, listed sizes...	46

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

(To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails....	\$2.55
Coated nails	2.55
Cutnails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	\$3.05

	Base Column
Woven wire fence*.....	67
Fence posts (carloads).....	69
Single loop bale ties.....	59
Galvanized barbed wire†.....	70
Twisted barbless wire.....	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOILER TUBES

Seamless Steel and Lap Weld Commercial
Boiler Tubes and Locomotive Tubes
Minimum Wall
(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless	Lap Weld,
	Cold Drawn	Hot Rolled
2 in. o.d. 13 B.W.G. 15.03 13.04 12.38		
2½ in. o.d. 12 B.W.G. 20.21 17.54 16.58		
3 in. o.d. 12 B.W.G. 22.48 19.50 18.35		
3½ in. o.d. 11 B.W.G. 28.37 24.62 23.15		
4 in. o.d. 10 B.W.G. 35.20 30.54 28.66		
(Extras for less carload quantities)		
40,000 lb. or ft. over.....	Base	
30,000 lb. or ft. to 39,999 lb. or ft. 5%		
20,000 lb. or ft. to 29,999 lb. or ft. 10%		
10,000 lb. or ft. to 19,999 lb. or ft. 20%		
5,000 lb. or ft. to 9,999 lb. or ft. 30%		
2,000 lb. or ft. to 4,999 lb. or ft. 45%		
Under 2,000 lb. or ft.....	65%	

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)

Base Price—\$2.00 Per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.....	68½	57½

Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.....	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.....	64	52½
3½ to 6 in.....	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.....	31½	14½
4 in.	33½	18
4½ to 8 in.....	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.....	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.....	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.....	63	52½
3½ to 6 in.....	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.....	39	22½
4½ to 6 in.....	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld 8 in. and smaller.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago..	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham ..	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....	5.20c.
No. 6, f.o.b. Bayonne, N. J.....	3.21c.
No. 6 Bur. Stds., del'd Chicago..	4.50c.
No. 3 distillate del'd Cleveland..	6.50c.
No. 4 indus., del'd Cleveland....	6.00c.
No. 6 indus., del'd Cleveland....	5.00c.

CONTINENTAL
ANNOUNCES A

New Lead-Sealed Sheet



WITH DEFINITE ADVANTAGES FOR SHEET METAL WORKERS AND MANUFACTURERS

Produced by a newly developed and superior process for coating steel with lead, Continental's new LEAD-SEALED sheet offers many important advantages over commercial long terne sheets and commercial galvanized sheets.

Continental LEAD-SEALED will find increasing use for furnace housings and pipes, ducts, fire doors, gasoline and oil cans, tanks, truck and trailer bodies, and scores of other manufactured products. In farm machinery and other industries, Continental LEAD-SEALED sheets will prove an excellent substitute for galvanized sheets.

Some of the advantages of the new Continental LEAD-SEALED sheet are:

1. Its lead-coating, applied by the new and special process, affords superior protection against rust and corrosion of the base metal.
2. The lead-coating serves as a lubricant in die forming.
3. It affords an ideal painting surface and requires no preparatory treatment.
4. It solders more easily than galvanized sheets.

While Continental LEAD-SEALED sheets can now be supplied only on orders having an A-1-j priority or better, inquiries for further information and samples are invited.

CONTINENTAL STEEL CORPORATION - KOKOMO, INDIANA

The Superior Sheet Steel Co., Canton, Ohio - A Subsidiary



SUPERIOR

CONTINENTAL STEEL CORPORATION

PRICES

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads)\$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....\$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk).....\$74.50
50% (ton lots, packed)..... 87.00
75% (carload lots, bulk).....135.00
75% (ton lots, packed).....151.00

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 St)

F.o.b. Jackson, Ohio.....\$29.50*
Buffalo30.75*

For each addition 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton. for 0.75% phosphorus or over.

*Official OPACS price established June 24.

Bessemer Ferrosilicon

Prices are \$1 a ton above Silvery Iron quotations of comparable analysis.

Ferrochrome

(Per Lb., Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon.....13.00c.
2 carbon19.50c.
1 carbon20.50c.
0.10 carbon22.50c.
0.06 carbon23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

(Per Gross Ton, Delivered, Lump Size, Bulk, on Contract)

3 carbon\$113.00*
2.50 carbon 118.00*
2 carbon 123.00*
1 carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload..... \$2.00
Ferrotungsten, 100 lb. and less 2.25

Ferrovandium, contract, per lb. contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots..... \$2.25†

Ferrocobaltititanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload, contract, net ton.....\$142.50

Ferrocobaltititanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload, contract, net ton.....\$157.50

Ferrophosphorus, electric or blast furnace material, carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage freight, equalized with Rockdale, Tenn., gross ton..... \$58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage, freight equalized with Nashville, gross ton..... \$75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace..... 80c.

Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.... 80c.

Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa. 80c.

*Spot prices are \$5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores (51.50% Fe.)

(Delivered Lower Lake Ports)

Per Gross Ton

Old Range, bessemer, 51.50.... \$4.75
Old range, non-bessemer, 51.50. 4.60
Mesaba, bessemer, 51.50..... 4.60
Mesaba, non-bessemer, 51.50.... 4.45
High phosphorus, 51.50..... 4.35

Foreign Ores*

(C.I.f. Philadelphia or Baltimore, Exclusive of Duty)

Per Unit

African, 46-48 Mn.....66.5c. to 68c.
Indian, 48-50 Mn.68c. to 70c.

Brazilian, 46-48 Mn.....67c. to 68c.
Cuban, 51 Mn.81c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered.....\$24 to \$26

Tungsten, domestic scheelite, at mine\$24.00 to \$25.00

Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton;

South African (low grade)...\$28.00
Rhodesian, 45Nom.

Rhodesian, 48Nom.

*Importations no longer readily available. Prices shown are nominal.

COKE*

Furnace

Per Net Ton

†Connellsville, prompt\$6.00

Foundry

†Connellsville, prompt. \$6.75 to \$7.00

*Maximum by-product coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the ceiling prices was published in THE IRON AGE, Sept. 25, p. 94B. Maximum beehive furnace coke prices established by OPA, Jan. 26. †F.O.B. oven.

By-product, Chicago\$12.25

By-product, New England.....\$13.75

By-product, Newark..\$12.40 to \$12.95

By-product, Philadelphia\$12.38

By-product, Cleveland \$12.30

By-product, Cincinnati.....\$11.75

By-product, Birmingham\$8.50†

By-product, St. Louis\$12.02

By-product, Buffalo\$12.50

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton.....\$40.00

Angle bars, 100 lb..... 2.70

(F.o.b. Basing Points) Per Gross Ton

Light rails (from billets).....\$40.00

Light rails (from rail steel)... 39.00

Base per Lb.

Cut spikes 3.00c.

Screw spikes 5.15c.

Tie plates, steel 2.15c.

Tie plates, Pacific Coast..... 2.30c.

Track bolts, heat treated, to railroads 5.00c.

Track bolts, jobbers discount.. 63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va

FLUORSPAR

Fire Clay Brick

Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail \$25.00

Domestic, f.o.b. Ohio River landing barges 25.00

No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines 25.00

Foreign, 85% calcium fluoride, not over 5% Si, c.i.f. Atlantic ports, duty paid.....Nominal

Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....\$34.00

As above, in bags, f.o.b. same mines 36.40

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Per 1000

Super-duty brick, St. Louis...\$64.60

First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 51.30

First quality, New Jersey..... 56.00

Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 46.55

Second quality, New Jersey... 51.00

No. 1, Ohio.....43.00

Ground fire clay, net ton..... 7.60

Silica Brick

Pennsylvania\$51.30

Chicago District 58.90

Birmingham 51.30

Silica cement, net ton (Eastern) 9.00

Chrome Brick

Per Net Ton

Standard, f.o.b. Baltimore, Plymouth Meeting and Chester...\$54.00

Chemically bonded, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 54.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester\$76.00

Chemically bonded, f.o.b. Baltimore 65.00

Grain Magnesite

Domestic, f.o.b. Baltimore and Chester in sacks.....\$44.00

Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00